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THE COLEOPTERA
OF
THE BRITISH ISLANDS.

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THE
COLEOPTERA

OF
THE BRITISH ISLANDS.

*A DESCRIPTIVE ACCOUNT OF THE FAMILIES, GENERA, AND
SPECIES INDIGENOUS TO GREAT BRITAIN AND IRELAND,
WITH NOTES AS TO LOCALITIES, HABITATS, ETC.*

BY THE
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PREFACE.

THE following work was originally taken in hand in order to provide a want that has been much felt by British Coleopterists, namely, a short account of our indigenous Coleoptera, with some reference to their localities and habits, and, where possible, to their life history: since it was begun it has somewhat increased in scope, as it was found impossible to reduce it within short limits, and at the same time not detract from its usefulness. At the outset I was promised valuable assistance by the late Dr. Power, Mr. Champion, Dr. Sharp, Rev. A. Matthews, Mr. Mason, and other leading Coleopterists, who have most kindly placed the requisite material at my disposal, and in many ways helped me. I must also express my great obligations to Mr. Bates for his valuable assistance in the classification of the Carabidae, and to M. Bedel for his kindness in placing his structural plates of *Dytiscus* and *Pterostichus* at my disposal, as also to the Rev. A. Matthews for the two structural figures which he has drawn for me, which are most valuable as coming from one who has of late years bestowed especial study on the external skeleton of Coleoptera.

I have endeavoured to make an especial point of the distribution of our British species, and have been much interested in this part of the work by finding how very few beetles are really common in the sense of being generally distributed, and, on the other hand, how very few are really rare: the majority of the so-called scarce species are locally abundant, and may be found in numbers if their habits are discovered. It is obvious that the question of distribution is one that can only be settled by the aid and co-operation of many collectors, and I therefore take this opportunity of saying that I shall be very grateful for any lists of local captures, more especially in Wales or Ireland: the latter country has been very little worked for Coleoptera, but I have nevertheless obtained much valuable information from Haliday's Belfast list, McNab's Dublin list, and Dr. Power's list of species taken near Waterford, and also from the Rev. W. F. Johnson of Armagh, who is doing very good work at the Irish Coleoptera: the Scotch localities are admirably worked out in Dr. Sharp's catalogue published in the *Scottish Naturalist*. With regard to the English localities, I have had the advantage of the use of Mr. Champion's most complete Kent and Surrey list (which is especially

valuable as giving accounts of habitats as well as localities); and of the various local lists that have from time to time been published, among which Mr. Boid's list of the Coleoptera of Northumberland and Durham, and Mr. W. Garneys' Repton list may particularly be noticed. Besides these I have received valuable help from Mr. W. G. Blatch (to whom I am very much indebted for his exhaustive list of Midland localities), Dr. J. W. Ellis, Mr. J. Chappell, Mr. Butler, Mr. Collett, Mr. Reston, Mr. T. Wood, Mr. J. J. Walker, Mr. C. G. Hall, Mr. A. C. Horner, Rev. W. C. Hey, Mr. C. O. Waterhouse, Rev. H. S. Gorham, and others who have kindly helped me, and are still continuing to do so.

In doubtful cases I have taken considerable pains to verify references, and I believe that nearly all the localities given are correct ones.

With regard to the books consulted I feel that it is hardly necessary to give a full list; I should, however, like to mention Bedel's "*Faune des Coléoptères du bassin de la Seine*;" Horn's "*Carabidæ*;" Horn and Leconte's "*Classification of the Coleoptera of North America*;" Dawson's "*Geodephaga Britannica*;" Sharp's "*Dytiscidæ*;" the "*Naturgesichte der Insecten Deutschlands*" by Erichson, Schaum and others; Thomson's "*Skandinaviens Coleoptera*;" the works of Fairmaire and Laboulbène, and Mulsant and Rey; Schiödte's "*De Metamorphosi Eleutheratorum*," and various monographs and treatises, such as Sharp on the British *Homalotæ*, &c.: in several genera I have found the characters given in Cox's Manual of British Coleoptera very useful.

The question of nomenclature is at present in such a confused and transitional position that I have preferred to follow the old and well-known system rather than adopt the changes that have been so largely introduced into the European catalogue: I have therefore altered very few names, but have in most cases appended the newly revived names as synonyms, and referred to them in the index, so that few mistakes can arise. It appears to me that nothing but utter confusion can result from the present passion for the law of absolute priority, and in this I am borne out by Dr. Sharp's recent paper, "*On some proposed Transfers of Names of Genera*" (Transactions Ent. Soc. London, 1886, p. ii. 181), which was written in answer to a pamphlet by M. des Gozis, entitled, "*Recherche de l'Espèce typique de quelques anciens genres*." Under the new system *Necrophorus* becomes *Silpha*, and *Silpha Necrophorus*; *Procrustes* becomes *Carabus*, *Carabus* is changed to *Tachypus*, and *Tachypus* requiring a new name is called *Asaphidion*; even *Melolontha* is found to relate to *Clythra*, and our common cockchafer becomes *Lulibrius vulgaris*; the genus *Homalota*, moreover, is found to comprise but one single species. These instances will show the utter confusion that would arise, and I certainly do not feel justified in adopting these radical changes, the utility of which is so very doubtful, and which in many cases are evidently erroneous, as we often have no means of judging from the very meagre descriptions of the old authors what the insect was that they really described and named.

In considering the arrangement of the work, it appeared to me the

best plan first to tabulate the species at the head of each genus, and then to describe them separately afterwards: at the same time the tabular arrangement is often more or less artificial, and by no means satisfactory in all cases: it must, therefore, be always taken in conjunction with the descriptions, and not apart from them: in some genera (e.g. *Myllena*) where the differences are obviously comparative, and hardly capable of being expressed in succinct terms, I have not hesitated to omit the tables altogether, and in others (e.g. *Hydroporus*) I have given them with great reserve.

I should like to observe that any student who intends to study Coleoptera should first acquire a knowledge of the general forms of the particular families, tribes, and groups by reference to a good collection or to figures: it is impossible to obtain this from mere descriptions, which are only of real practical use after this superficial knowledge has been obtained. It is quite erroneous to suppose that any beetle can be named straight off from a book by a dichotomous system, by any person who does not possess some general knowledge of its position in the order.

In a work like the present, in which so many details have to be examined into and verified, and many thousand references to localities collected and tabulated, it is impossible to avoid some errors and inaccuracies: I have, however, endeavoured to be as accurate as possible, and shall be very much obliged if any person who peruses it will kindly inform me of any errors, with a view to their correction. I may perhaps be allowed in conclusion to add that it has been written at odd times, often amidst constant interruptions, and during the intervals of close ordinary work. I hope, however, that it may, at all events, prove of some help towards encouraging the study of our native Coleoptera.

THE SCHOOL HOUSE, LINCOLN,
Nov. 1886.

GLOSSARY.

Ab- in composition indicates away from, departure from, as *abnormal*, departing from the usual rule.

Aborted. Incomplete, undeveloped.

Acicular. Terminated in a sharp point like a needle (*acus*).

Aciculate. Covered with small scratches which appear as if made by a needle's point.

Aeulate. Produced to a point; as applied to one group of Hymenoptera it means furnished with a sting.

Acuminate. Terminated in a point.

Agglutinate. Fastened closely together so as to form one piece.

Alutaceous. Covered with minute cracks like mud or like the human skin.

Ambulatorial, *Ambulatory*. Relating to walking, or progress on land, sometimes opposed to *cursorial*, and sometimes to *natorial*.

Anal. Pertaining to the apex or extreme end of the abdomen.

Annulate. Ringed (of colour).

Ante- in composition means before, in front of; e.g. *antecocular*, situated in front of the eye.

Apex. The extremity.—*Apical*. Relating to the extremity.

Apoel. Without legs; of certain larvae, e.g. *Corygon*.

Appendiculate. Furnished with appendices, e.g. extra lines or furrows at the end of other lines and furrows.

Approximate. Brought near to one another.

Apterous. Wingless.

Armature. Cornuous parts of the organs of generation.

Articulated. Jointed.—*Articulation*. Joint.

Asperate. Roughened, of sculpture.

Asymmetrical. With one side of the body different from the other side.

Attenuated. Gradually diminished or narrowed.

Base. The root or bottom, the part on which an organ stands, or from which it takes its rise: for the various uses of the terms *apex* and *base* as applied to different parts of the body in the Coleoptera, see *Introduction*, p. xxix.

Basal. Pertaining to the base.

Bi- in composition signifies in two parts, or a doubling; e.g. *bifid*, cleft into two divisions; *bisetose*, furnished with two setæ.

Buccal. Relating to the mouth or sides of the mouth.

Calcar. A spur, strong spine, or pointed process.

Collus or *Callosity*. A slight projection or elevation.—*Callose*. Furnished with such a projection or elevation.

Canaliculate. Furnished with one or more channelled furrows.

Capillary. Slender and hair-like (of antennæ).

Carina. A keel, or longitudinal elevated line.—*Carinate* or *Carinated*. Furnished with a *carina*.

Castaneous. Chestnut-coloured.

Catenulate, *Cateniform*. Chain-like.

Cicatrice. A large, deep, scar-like impression.

Ciliate. Furnished with *cilia* or fringes of hairs more or less parallel, like the eyelid.

Clava. The club or knob of the antennæ (especially evident in the *Claricornia*).—*Clavate* or *Claviform*. Clubbed or club-shaped.

Common. Extending over two neighbouring portions of the body, e.g. "elytra with a common spot."

Concolorous. Uniform in colour, in comparison of parts; e.g. "elytra dark with apex yellowish" as opposed to "elytra concolorous."

Confluent. Running one into another, of colour-patterns, or punctuation.

Conical. Shaped like a cone, tapering from base to apex.

Connate. Soldered together.

Coprophagous. Feeding on excrement.

Cordate, *Cordiform*. Heart-shaped.

Coriaceous. Leathery; of the consistence of leather.

Corneous. Horny; of the consistence of horn.

Costate. Furnished with elevated costæ or longitudinal ribs.

Costiform. In the shape of a costa or raised rib.

Coxal. Relating to the coxæ; the coxal or cotyloid cavities are the cavities in which the coxæ articulate.

Crenate, *Crenulate*. Furnished with a series of very blunt teeth which take the form of segments of small circles.

Crepuscular. Coming out of hiding-places to feed, &c., during the twilight.

Cretaceous. Chalky.

Cruciform. Cross-shaped.

Cupule. Small cup-shaped organs with which the anterior tarsi of certain males (especially among the *Dytiscidæ*) are furnished; they are used as suckers for adhering.

Cursorial. Adapted for running.

Cuspidate. Sharply pointed.

Cyathiform. Cup-shaped.

Dejected. Bent down.

Deliscent. Gaping apart towards apex.

- Dentate*. Toothed, furnished with tooth-like prominences.—*Denticulate* (diminutive of preceding). Furnished with small teeth: these terms are often used loosely.
- Depressed*. Flattened as if by pressure from above, often used as in opposition to *compressed*, flattened by lateral pressure.
- Digilate*. See *Palmate*.
- Dimorphic* or *Dimorphous*. Presenting two distinct types in the same sex (e.g. females of *Hydroporus*, *Dytiscus*, &c.).
- Disc*. The middle, the central portion.
- Discoidal*. Pertaining to the disc.
- Divaricate*. Used of two parts that are contiguous at base and very strongly deliscent at apex.
- Emarginate*. With a piece cut out of the margin, notched.
- Entire*. Without excision, emargination, or projection.
- Explanate*. Widened out, expanded.
- Facies*. General aspect of a species, genus, or group of insects.
- Farinose*. Presenting a mealy appearance.
- Fascia*. A coloured band.
- Ferruginous*. Rust-red.
- Filiform*. Thread-shaped; of antennæ, elongate and of about the same thickness throughout.
- Flabellate*, *Flabelliform*. Fan-shaped; of antennæ, with the upper joints prolonged into long branches.
- Fossorial*. Adapted for digging.
- Fovea*. A large round depression on the surface.—*Fovate* or *Foveolate*. Furnished with such depressions.
- Funiculus*. The joints of the antennæ between the scape (first elongate joint) and the club; especially applied to the Curculionidae.
- Fuscous*. Brown, or tawny-brown.
- Fusiform*. Spindle-shaped, broadest in the middle, and gradually narrowed in front and behind to a more or less pronounced point.
- Geniculate*. Elbowed or kneed, abruptly bent upwards or downwards.
- Gibbous*, *Gibbose*. Hump-backed, very convex.
- Glabrous*. Smooth, hairless, and without punctures or raised sculpture; quite glabrous surfaces in Coleoptera are usually shining.
- Granulate*. With small, rounded-off elevations.
- Granulation*. Applied to the eyes, the granulation of which is said to be fine or coarse accordingly as the facets are more or less numerous and pronounced.
- Gressorial*. Adapted for walking.
- Gular*. Pertaining to the throat.
- Heteromerous*. With the posterior tarsi composed of less joints than the anterior and intermediate ones.
- Hirsute*. Set with thick long hairs.
- Hispid*. Set with short erect bristles.
- Humeral*. The shoulder.—*Humeral*. Relating to the shoulder.
- Hybrid*. The offspring of two different species.

- Imbricate.* Overlapping one another like tiles on a roof.
- Impunctate.* Without punctuation.
- Incrassate.* Thickened.
- Infusate.* Darkened ; more or less fuscous in colour.
- Insertion.* Point of attachment of movable parts, e.g. antennæ.
- Interstices.* The spaces between striae or rows of punctures : the term is properly applied to the elytra only, the interspaces on thorax, &c., being called *intervals*, but the term *interstice* is often rather loosely used.
- Iridescent.* Exhibiting prismatic colours, changing in different lights.
- Justa-* in composition indicates near, as *justa-ocular*, situated near the eye.
- Lamina.* A flat plate.—*Laminæ* or *Lamellæ*. Plated.
- Lateral.* Pertaining to the side.
- Linear.* Narrow, elongate, and parallel-sided ; applied to a whole insect, or a particular portion.
- Lineated, Lineate.* With longitudinal stripes.
- Lobes.* Parts of an organ separated one from another by a more or less deep division.
- Lunulate.* Crescent-shaped.—*Lunule*. A crescent-shaped spot.
- Maculate.* Spotted.
- Margin.* The outer edge.—*Margined*. Furnished with a more or less distinctly pronounced outer edge.
- Median.* Central.
- Membranous.* Of the consistency of membrane.
- Moniliform.* Necklace-shaped, as if formed of beads ; of antennæ.
- Mucronate.* Prolonged in a sharp point.
- Mutic.* Without point or spine.
- Natatorial.* Adapted for swimming.
- Necrophagous.* Feeding on dead and decaying matter.
- Normal.* Usual or natural : this term is used very loosely, but it is often very useful, and its meaning in comparison is always easily understood from the context.
- Obconical.* In a reversed cone, with the thickest part in front : often used of joints of the antennæ, especially where these latter (as in *Homalota*, &c.) become gradually thicker towards apex.
- Obsolete.* Almost effaced, or only slightly marked.
- Ocellated, Ocellate.* Furnished with round spots surrounded by a ring of a lighter colour.
- Ocelli.* Small extra eyes usually situated on the top of the head.
- Ochraceous.* Brownish-yellow.
- Onisciform.* Shaped like an *Oniscus* or wood-louse.
- Onychium.* The last joint of the tarsi which bears the *onychæ* or claws.
- Orbital.* Relating to the upper border of the eye, as *supra-orbital*, situated above this upper border.
- Oral, Orate, Oroid.* Egg-shaped.
- Palmate.* Widened and divided like the hand : if the divisions are slender and elongate, the term *digitate* is used.

- Patella*. A little bowl or cup.—*Patelliform*. Cup or bowl-shaped.
- Pectinate*. Toothed like a comb.
- Peduncle*. A piece supporting an organ, or joining one organ to another like a neck.—*Pedunculate*. Furnished with such a supporting piece.
- Pentamerous*. With five joints.
- Penultimate*. Last but one.
- Perfoliate*. Formed of joints separated and as it were strung together by a common thread or narrow support running through them.
- Phytophagous*. Feeding on plants.
- Pilose*. Hairy.—*Verticillate-pilose*. Of antennæ, with hairs set round the vertex of each joint.
- Pitchy*. Blackish-brown: a somewhat loose colour term.
- Plicate*. Furnished with a fold or folds.
- Polymorphous*. Of various forms.
- Pores*. Large isolated punctures.
- Productile*. Capable of being lengthened out or produced.
- Propygidium*. Penultimate dorsal segment of the abdomen (visible in certain Histeride, &c., to which the term is applied: it is not used of the Brachelytra).
- Pubescent*. Furnished with pubescence or downy hairs.
- Puncture*. A small depression on the surface, usually round.
- Punctate*. Furnished with punctures.
- Punctate-striate*. With rows of punctures imitating and taking the place of striæ, opposed to *striate-punctate*, with punctured striæ; the former term is, however, sometimes used loosely by some writers for the latter.
- Pygidium*. Last dorsal segment of abdomen.
- Pyriform*. Pear-shaped.
- Quadrate*. Square.
- Quadri-* in composition indicates four times, e.g. *quadrimaculate*, with four spots.
- Raptorial*. Adapted for seizing and devouring prey.
- Reflexed*. Bent up, opposed to *deflexed*, bent down.
- Remiform*. Oar-shaped.
- Reniform*. Kidney-shaped.
- Reticulate*. Covered with a network of scratches or cross striæ.
- Rostrum*. Prolongation of the head between the eyes, especially applied to the Curculionide. *Rostrate*. In the form of a beak or rostrum.
- Rufous*. Reddish.
- Rugose*. Wrinkled.—*Rugulose*. Slightly wrinkled.
- Saltatorial*. Adapted for leaping.
- Scansorial*. Adapted for climbing.
- Scape*. The term applied to the first joint of the antennæ when it is considerably developed.
- Seroces*. Lateral furrows on the rostrum, holding the base of the antennæ when at rest: this and the preceding term are chiefly employed in speaking of Curculionide.

- Sculpture*. Modifications of surface in the way of punctuation, striae, elevations, &c., as opposed to *structure*, which has reference to the shape and construction of the various parts of the body.
- Scutellary*. Pertaining to, or near the scutellum.
- Securiform*. Hatchet-shaped.
- Serrate, Serriiform*. With teeth like a saw.
- Seta*. A long outstanding bristle or stiff hair.
- Setaceous*. Gradually tapering to the tip, like a bristle.
- Setiform*. Shaped like a bristle.
- Setose, Setigerous, Setiferous*. Set with or bearing setæ.
- Shagreened*. Covered with closely-set small roughnesses or unevennesses like shark's skin: the term is used sometimes of very fine sculpture with no pronounced punctuation (as in the case of the hind body of many species of *Ocyropa*, &c.).
- Simple*. With no unusual addition or modification, e.g. without spines, dilatation, emargination, &c.
- Sinuate*. Slightly waved.
- Spatulate*. Narrow at base and enlarged towards extremity.
- Spiracle* or *Stigma*. Openings for respiration on the surface of the body.
- Squamose, Squamate, Squamulose, Squamulate*. Covered with larger or smaller *squamæ* or scales.
- Stria*. An impressed line; sometimes, but rarely, used of an elevated line.
- Striate*. Furnished with striae.
- Stridulation*. Noise produced by the friction of one surface against another.—*Stridulatory*. Connected with stridulation.
- Strigose*. Scratched.
- Striolo*. An abridged or rudimentary stria.—*Striolate*. Furnished with such small striae.
- Style*. A pointed process.
- Sub*- in composition indicates *almost* or *slightly*, as *sublinear*, *subparallel*, *subquadrate*, &c.
- Subulate*. Terminating in a fine and sharp point, like an awl.
- Sulcate*. Furrowed.—*Sulciform*. Shaped like a furrow.
- Sutural*. Pertaining to the suture of elytra.
- Suture*. The line on which the elytra join: the term is also applied to the point of junction of any two free parts.
- Testaceous*. Yellowish, usually with a dusky tinge: not a bright yellow, although the term is very loosely used, and is applied to almost all yellowish or light-reddish yellow shades.
- Tetramerous*. With four joints.
- Tomentose*. Cottony.
- Transverse*. Broader than long.
- Trapezoidul*. In the shape of a trapezium or irregular four-sided rectangular figure.
- Tri*- in composition indicates three times, as *tricuspid*, divided into three points.

Truncate. Abruptly cut right across in a straight line.

Tubercle. A small abrupt elevation of varying form.

Unicolorous. Of the same colour throughout.

Unisetose. Bearing one seta.

Variolose. Covered with impressions or pits like the markings left on the face by small-pox.

Vermiculate. Covered with irregular, sinuate, worm-like little striae.

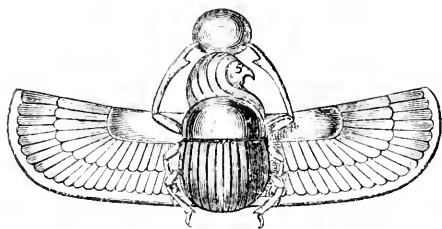
Versicolorous. Of various colours.

Venter. Upper surface of the head behind the eyes.

Vesicant, Vesicatory. Raising a blister (applied to *Mylabris*, *Cantharis*, &c.).

Villose. Covered with long raised closely-set hairs.

Xylophagous. Wood-feeding.



INTRODUCTION.

THE order Coleoptera may be roughly characterized as follows:—Mouth mandibulate; prothorax free and not agglutinate as in the Hymenoptera, Diptera, and Lepidoptera; anterior wings (elytra) horny or leathery, more often the former, as a rule united down the back by a straight suture; posterior wings membranous, longitudinally and transversely folded beneath the elytra; occasionally the posterior wings are rudimentary, and in such cases the elytra are often soldered together along the suture; this often appears to be a result of the circumstances under which the insect lives, as occasionally a species is found with wings in one locality and without them in another.

Fig. 1.



Pupa of Bee
(Front).

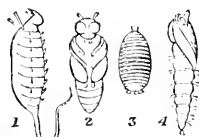


Pupa of Bee
(Profile).



Pupa of Sphinx-
Moth.

Fig. 2.



Pupae of Diptera.

1. Pupa of Drone-fly still in larva skin.
2. Ditto, with larva-skin removed.
3. Ditto of Anthomyia.
4. Ditto of Mycetobia.



Pupa of Dy-
tiscus.

The metamorphoses of the Coleoptera are complete with the exception of the pupa, in which, although it is inactive, the parts of the perfect insect are always distinctly traceable.

The position of the Coleoptera among the Insecta has been much disputed: many authors place them at the head of the class, considering that their development is of a higher character than that of the other orders; if, however, we are to consider the metamorphoses the Lepidoptera must precede them, and some writers are of opinion that the Diptera and Hymenoptera should also be ranked before them: the question after all is not a very important one, and it is almost impossible to settle it with any certainty.

The insects belonging to the old order Strepsiptera (Stylops, &c.) have been for some time rightly ranked with the Coleoptera as abnormal members of the order; their true position, however, in relation to the other Coleoptera can hardly be considered established. Professor Westwood in his "Modern Classification of Insects," vol. i., p. 34 (1839), says that the number of species of Coleoptera with which Entomologists are actually acquainted cannot be less than 35,000, and prophesies that, when the number of species of foreign climes shall have been collected, the number will be doubled, if not trebled: this prophecy has been strikingly verified, for upwards of 100,000 species at least must be now known, and numbers of new species are constantly being found in all quarters of the globe.

The question of the classification of the various sections and families is a most difficult one, and will not be here touched upon; it is intended, however, to discuss the classification adopted in this work at its conclusion, and various points will be alluded to under the different divisions and families. The constant discovery of new synthetic forms that often upset all preconceived ideas of classification of particular groups or genera makes it impossible to establish any real or definite system, and in fact our knowledge of the Coleoptera, their relations to one another, and the proper positions that they ought severally to hold, may be said to be as yet in its infancy; except for a few broad lines that are followed by all, their classification appears to be more or less artificial, and too often a matter of taste and convenience, rather than of scientific accuracy.

Distribution of the Coleoptera in time.—Two or three supposed specimens of Coleoptera have been recorded from the rocks of the Palæozoic period, but these have been proved lately not to be Coleoptera at all; the earliest known insect is a Blatta which was found in the Middle Silurian strata, in France, in December, 1884; up to this time the oldest known representatives of the Insecta consisted of six wings obtained by Mr. C. F. Harit in 1862, from the Devonian shales of New Brunswick; two scorpions, however, have been found in the Upper Silurian, and these, as insect-eaters, prove the existence of insects at the period during which the strata were being formed. It is possible that the Coleoptera existed at the end of the Palæozoic period, but it appears to be most probable that they did not appear until the commencement of the Secondary period; the earliest known undoubted species are described by Herr from the Swiss Trias, the oldest formation

of the Secondary period, and consist of three species (*Glaphyrophtera pterophylli*, *Curculionites prodromus*, and *Chrysomelites Rothenbachi*): the earliest recorded British species are from the Lias, and consist of a good many species of *Curabida*, *Buprestida*, *Dytiscida*, *Melolonthida*, &c.: throughout the Oolitic and Cretaceous rocks they are found in greater or less numbers, and in the strata of the Tertiary period, as we should expect, they become more and more common; from two quarries in the Upper Miocene near Lake Constance Heer took 2456 specimens of Coleoptera, belonging to 518 species: we should naturally expect that the Coleoptera would be preserved better than any other insects because of the hardness of their integument, and such in fact is the case: it seems, therefore, all the more certain that they did not appear in the Palaeozoic period. Those students who desire to examine into this very interesting question are advised to consult the works of Mr. Scudder and M. Brogniart, and the valuable papers of Mr. H. Goss in the "Proceedings of the Geologist's Association," vols. v., vi., and ix.

INTERNAL STRUCTURE.

The internal structure is discussed very fully in Burmeister's "Manual of Entomology;" it is not, however, necessary here to do more than touch upon a few points.

The organs of nutrition consist of the intestinal canal and its appendages; this canal is terminated at one end by the mouth and at the other by a vent or anus, which latter is invariably present in all perfect insects, although in certain orders it is occasionally absent in the larval state; the hinder portions of the intestinal canal (*duodenum*, *colon*, *cæcum*, &c.) need not here be discussed, but a few words may perhaps be said upon its anterior appendages: the mouth opens upon a *pharynx*, which is the distended commencement of the *oesophagus*: the oesophagus extends from the pharynx to the stomach, and in all orders (except the Lepidoptera, in which it is forked) it passes through the entire cavity of the thorax as a simple tube: the third division of the intestinal canal is the *proventriculus*, a small narrow and tubular cavity, furnished within with folds, teeth, spines, or projecting horny ridges; it may, as Burmeister remarks, be considered as the mouth of the stomach, in front of which it is directly situated: it is found in all mandibulate insects which feed upon hard substances or require their food to be triturated previously to digestion: it is therefore present in all the carnivorous and wood-feeding Coleoptera, but is not extended through the whole order, and is not found in the suctorial orders of insects such as the Lepidoptera: it is more distinctly muscular than the rest of the intestinal canal, and evidently answers to the gizzard of the gallinaceous birds.

The stomach of the Coleoptera is rather variable in its formation: it is of very simple structure, as might be expected from the nature of their food, in the Lamellicornia and Phytophaga, but in the Carnivorous series it is much more complex, being short and separated from the

proventriculus, which is always present, by a distinct constriction, and having the whole or greater part of the upper surface covered with long, thin flocks, which originate from the inner mucous membrane of the stomach, and are evidently secreting organs, whose secretion makes more soluble the heavily digestible animal matter (v. Burmeister, l. c. p. 132). The divisions of the intestinal canal which follow the stomach are usually simple, and do not present many changes of form, although they vary considerably in length.

The nervous system is formed of a series of ganglia or nervous centres united by one or two cords of nerve; these ganglia differ in number, but as a general rule "the ventral cord has as many ganglia as there are freely movable divisions of the body:" the larvæ of the Lepidoptera and carnivorous Coleoptera possess as many ganglia as segments; in the Diptera in which the three segments of the thorax are united and agglutinate we find only one thoracic ganglion, and further in those larvæ in which the bodies are thick and fat and possess no distinct segments (e.g. in the Lamellicornia) there is no distinct ganglion, but a simple cord from which the nerves pass off on each side; in the perfect beetle there are less ganglia than in the larva, and there are less in species belonging to some families than in those belonging to others.

The circulatory system consists of a heart, or an organ answering to a heart, divided into several chambers arranged longitudinally, and opening one into the other, by means of the alternate contraction and dilatation of which a white cold clear fluid corresponding to blood is circulated through the so-called blood-vessels, which appear to be closely connected with the tracheæ of the respiratory system.

The respiratory system is made up of the external *spiracles* or *stigmata*, and the internal *tracheæ*: the former are apertures on the surface of the body by means of which air is taken in, and the latter are the tubes by which it is distributed throughout the system; there are two large connecting tracheæ from which smaller branches ramify in every direction over the body: in the Coleoptera we may say, roughly speaking, that each segment of the body has a spiracle, or perhaps more correctly that one is to be found on the boundaries of every two segments; their shape and position in some families, e.g. the Dytiscidæ, afford good characters for the distinction of genera. Gills or *branchiæ* are very rarely found in the Coleoptera; they occur, however, in certain larvæ (e.g. *Gyrinus*, *Chemidonus*, *Hydrous caraboides*, *Berosus*, &c.) in the form of processes, fringed or otherwise, arising from the sides of the segments: all those insects which are not provided with gills have to rise frequently to the surface of the water to obtain the requisite supply of air which they in most cases draw more especially through the spiracles situated at the posterior end of the body.

The organs of generation are variously modified, and consist of a male intromittent organ and a female receptacular organ and ovipositor; the sexes are always separate: in some groups a most important specific character is afforded by the *adeagus*, which some writers most erroneously

confound with the male intromittent organ; it is really (as Dr. Sharp, who has studied the character more than any other author, informs me) a segment of the body withdrawn into the interior and variously and profoundly modified for the purposes of fertilization; in some cases it appears to consist of more than one segment; in the Dytiscidae it is arranged so as perfectly to keep out water during coupling; it is not properly speaking part of the organs of generation, but is a highly modified secondary sexual apparatus, which has nothing homologous with it in the Vertebrata; it is of extreme variety in the Coleoptera, and appears not to be absolutely confined to the male, for where the number of external segments in the male and female is the same, there will be found in the female an internal (usually chiefly membranous) segment homologous with the male cedeagus: in the Staphylinidae the segment preceding the cedeagus is also more or less modified or retractile.

Occasionally the modifications of the organs of generation are very curious: the female of *Cebrio gigas*, for instance, usually lives below the surface of the ground, above which, at the period of coupling, it protrudes a long horny tube, the extremity containing the organs of generation; at this time the males may be found searching eagerly for the females; after coupling the same organ is employed to introduce the eggs to a proper depth under ground (v. Westwood, *Classif.* i. 245).

The difference in structure of the sexes with a view to generation, especially as regards the development of the tarsi, femora, &c., in male, and the sculpture of the upper surface of the female are in many cases of the greatest interest; the antennae also are often largely modified as in certain Elateridae, Meloë, &c.; these differences, however, belong rather to external structure, and will be more fully alluded to under the several genera.

EXTERNAL STRUCTURE.

As it is chiefly on the external structure that descriptions of Coleoptera are at present founded, it is of the first importance that all students of the order should make themselves thoroughly acquainted with it and with the terms employed in describing it; the details, therefore, of the complicated external skeleton, mouth parts or trophi, antennae, legs, &c., must be fully explained in any work like the present, and will therefore for convenience sake be treated of under three separate headings.

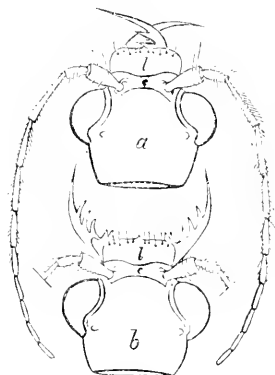
1st. The head, including its mouth organs, antennae, and eyes; 2nd. The thorax, including its appendages, the wings, and the legs; and 3rd. The abdomen or hind-body, by which latter term it is generally now known in descriptions of the Staphylinidae.

THE HEAD.

The head varies very greatly in form: as a rule the hinder portion is not narrowed and is simply incited into the front of the thorax, to which

it is joined by membrane; sometimes, however, it is contracted behind and lengthened, and is occasionally behind the constriction expanded into a semi-globular knob or condyle, which acts as a sort of ball and socket joint and admits of free movement in every direction (as in some genera of the Truncatipennes, the Brenthidæ, &c.); in front of the head there is usually a suture stretching right across between, or in front of, the antennæ; this is called the *clypeal suture*, and the part it cuts off from the head is called the *clypeus*; if, as often is the case, an apparent suture is seen in front of the clypeus it is due to the junction of the *labrum* or upper lip which will be spoken of under the mouth organs: the clypeus is sometimes called the *epistoma*; according to some authors when large it is styled the *clypeus*, and when small the *epistoma*, but this latter term is used very loosely and seems by some writers to be applied to the *labrum* or to the *labrum* and *clypeus* combined, thus including, as its name implies, all the parts over the mouth. The insertion of the antennæ relatively to the clypeus is in some groups a very important character; thus in the Cicindelidæ the clypeus extends on both sides in front of the insertion of the antennæ, whereas in the Carabidæ it does not extend so far towards their sides as the insertion: this will be perhaps better understood by comparing the shape of the head of Cicindela as given in the accompanying woodcut with the shape of the head of Pterostichus (Plate A, Fig. I.).

Fig. 3.



a. Head of Cicindela (magnified) with jaws closed. *b.* Ditto, with jaws open. *l.* Labrum. *c.* Clypeus.

In the Rhynchophora, as a rule, and in other groups very rarely, the head is prolonged in front, so that the prolonged portion is as long as the rest of the head, or even as long as the whole body (as in *Balaninus*); this prolongation is called the *rostrum*; the mandibles and maxillæ are situated at the end of the rostrum, and not at its base, as seems rather a common idea: the rostrum, therefore, is a true portion of the head, and in no sense a trunk; on each side of the rostrum there is usually a groove which varies in size, and into which the insect retracts the *scape* or long first joint of the antennæ when at rest: these are called *scrobes*, and are very useful characters in the determination of the Rhynchophora; the outer side of the mandibles is in some families (e.g. the Carabidæ) concave, forming an elongate groove: these grooves are called the *mandibular scrobes*. The anterior part of the head is called the *forehead* or *front*, the central portion the *vertex*, and the posterior portion the *occiput*; as, however, the head is usually more or less sunk in the thorax, and the occiput more or less hidden, the whole portion from the eyes to the front margin of the thorax is often roughly spoken of as the vertex.

The eyes are very variable; rarely as in *Anillus*, and in many cave insects, they are wanting; they are made up of a large number of small lenses, which vary very much in number and size: in some groups, as for instance *Lampyris*, their formation affords good specific characters, the eyes being said to be finely or coarsely granulated, accordingly as the number and so the individual size of the lenses is greater or smaller: in some families additional eyes are found consisting of one or two simple lenses; these are termed *ocelli*, and are situated on the vertex behind the true eyes; they occur in the Homaliniæ, &c. Occasionally the eyes are partially or almost entirely divided by a corneous ridge as in *Dorcus* and *Throscus*, or they may be entirely divided, so that there are two eyes on the upper surface of the head and two on the under surface as in *Gyrinus* and *Amphips*. The head is often furnished with long erect setæ arising from pores or special punctures; their function is probably the same as the whiskers of the feline tribe of animals, as they seem especially developed in those beetles that are carnivorous and nocturnal in their habits, e.g. the Carabidæ. Dr. Horn in his valuable paper on this family has made great use of those that are found on the surface of the head near the eyes in the classification of the Harpalinæ, those genera that possess one such seta being classed under his group *H. uniseta*, and those that possess two under his other great group *H. biseta*.

In some families the head is furnished with large horns and other appendages, which are especially found in the male, and arise chiefly from the clypeus: these are particularly noticeable in the Lamellicornia; with the exception, however, of *Copris* and one or two other species none of our indigenous beetles possess them in a marked degree.

The *antennæ* are jointed appendages which are usually inserted in front of, more rarely between, the eyes: in the Rhynchophora they arise from the rostrum either further from or nearer to the base; they are extremely variable in shape; a very full description of the various forms which they present is to be found in Leconte and Horn's "Classification of the Coleoptera of North America," Preface, pp. xii and xiii; those forms that chiefly require notice are as follows:—

1. *Filiform* or thread-like, in which the joints are elongate and cylindrical, and the apical ones not or scarcely enlarged; if they become more slender towards the tip they are called *setaceous*; such antennæ are one of the chief characteristics of the *Carabidæ* and *Dytiscidæ*.

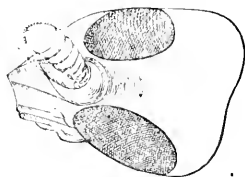
2. *Claviform* or *clavate*, in which the apical joints are enlarged and form a more or less distinct knobbed club; sometimes the club is gradual, in other cases sudden and abrupt: in the latter case the antennæ are said to be *capitate*.

Fig. 4.



Small portion of eye highly magnified.

Fig. 5.

Side view of head of *Gyrinus*.

3. *Serriform* or *serrate*, in which the joints are more or less triangular and compressed, and present a serrate edge on their anterior margin (as in various *Elatridæ*, &c.): as a rule the serriform antennæ present no appearance of a club, but at the extreme end of the series there occur forms (e.g. *Clerus*, *Corymbetes*, &c.), in which by insensible gradations they have passed into the fully clavate form; if the joints of the serrate antennæ are much prolonged anteriorly they are said to be *pectinate* (as in *Corymbites*), if much prolonged on both sides, *bipectinate*: when the prolongations are very long they are said to be *flabellate* or fan-like (as in *Pyrochroa*), and when this form of joint is flexible and presents a feathery appearance they are called *plumose* (as in certain exotic *Malacodermata*).

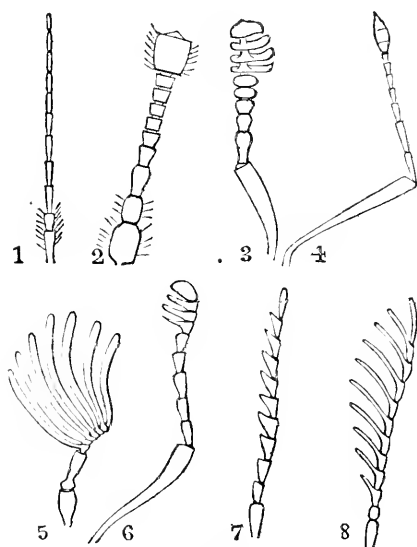
4. *Lamelliform* or *lamellate*: this is really a form of the clavate

antenna, in which the clava takes the shape of large plates which oppose flat surfaces to one another, and so form a one-sided club which can be opened or shut by the insect at pleasure: this is shown in *Lucanus*, and more especially in *Melolontha*; the club of *Lucanus* is comparatively small, and is termed a *fissate* club.

5. *Moniliform*: this is really a transitional form between the filiform and clavate antennæ: the joints of the antennæ do not differ greatly in size, but are separately rounded, and present the appearance of a string of beads (as in many of the *Chrysomelidæ*).

There are many other modifications, but the ones referred to are the most noteworthy, and on them have been founded several great divisions of the *Coleoptera* (*Cloicornia*, *Serricornia*, *Lamellicornia*, &c.): these divisions are practically useful, but it must be remem-

Fig. 6.



Antennæ.

- | | |
|---------------------|------------------|
| 1. Filiform. | 5. Lamellate. |
| 2. Capitite. | 6. Fissate club. |
| 3. Perfoliate club. | 7. Serrate. |
| 4. Geniculate. | 8. Pectinate. |

bered that they are more or less artificial, and in many instances are found to pass by gradations the one into the other.

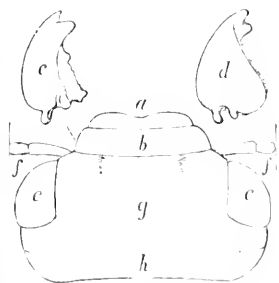
The antennæ of the *Rhynchophora* are very peculiar, and consist, as a rule, of a very long first joint called the *scape*, with which the other joints form an angle: the antennæ usually end in a club, and in this case

the joints between the scape and the club are termed the *geniculus*: all such elbowed antennæ are termed *geniculate*: the elongate first joint or scape, although not in so marked a degree as in the Rhynchophora, is found in other Coleoptera, e.g. *Cryptobium* among the Staphylinidæ, &c.

The trophi or mouth organs.—The Coleoptera belong to the mandibulate as opposed to the haustellate insects, that is to say they are furnished with horizontally moving jaws for seizing and masticating their food; the haustellate insects, on the other hand, like the Lepidoptera, obtain their food by suction by means of a tube or trunk: if we examine the underside of the head of any beetle we shall find that nearer to or further from the front there is a suture: this suture is called the *mental suture*, or more generally the *gular suture*; this last term, however, is erroneous, as the gular sutures proper lie at the sides between the opening of the mouth and the mental suture; if with a needle (ground down to an edge on a fine hone and fixed by sealing-wax into a piece of wood such as a match stem) we divide this mental suture, and in the case of a larger insect the gular sutures proper as well, we shall be able to separate and examine in detail all the mouth organs: it is very necessary that all students of Coleoptera should be able to dissect these, at all events to a certain extent; for, although classification by the external skeleton and other characters is more and more taking the place of classification by the trophi, yet at present these still play a very considerable part in the classification of the Coleoptera, and they must always be considered as at all events of very great secondary importance; unless they are dissected out, it is impossible to examine them properly, and therefore unless a student is able to dissect he will not be able in many instances to rightly determine the genera, much less the species: a little practice is all that is required: as a rule, when the mental suture is severed, the mentum, labium and maxillæ may at once be removed in one piece; the mandibles may be examined without removal: if, therefore, the mouth parts are carefully dissected and the insect again remounted, it will to all intents and purposes be still perfect.

Above the mouth there is usually visible a small piece which is called the *labrum* or upper lip; it is usually, but not always, more or less membranous; it either projects wholly or partially beyond the clypeus, or it may be completely hidden behind the clypeus and be connate with it; useful characters are sometimes found in its shape, whether emarginate, truncate, projecting, &c. Below the labrum come the large jaws or *mandibles*, which are the most powerful of the mouth organs; they vary much in shape according to the food of the insect:

Fig. 7.

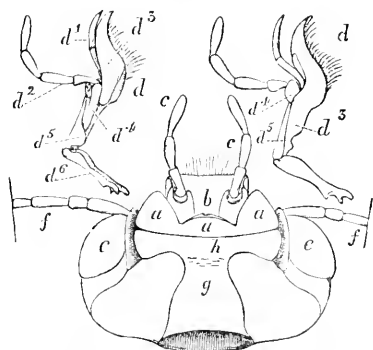
Head of *D. marginalis*, upper side.

a. Labrum, *b.* Clypeus, *c.* *d.* Mandibles, *e.* Eyes, *f.* Base of antennæ, *g.* Vertex, *h.* Occiput.

the food of the insect:

in the Carnivorous beetles they are usually sharply pointed and furnished with a cutting edge in order to enable them to seize and hold fast and cut up their struggling prey; in the plant-feeding beetles they are broad and blunt, and more adapted for trituration than cutting; the cavities at the sides of the mandibles (in the Carabidæ, &c.) have been before referred to as termed the *mandibular scrobes*: these scrobes are often furnished with single long setæ, which seem to have much the same office to perform as the supra-orbital setæ above referred to, and probably bear some analogy to the whiskers of the feline tribe. Below the mandibles

Fig. 8.

Under side of head of *D. marginalis*.

a. Mentum. *b.* Lingua or ligula. *c.* Labial palpi. *dd.* Maxillary palpi (dissected out). *d1.* Outer lobe. *d2.* Maxillary palpus. *d3.* Lacinia or blade (forming the inner lobe of the palpi). *d4.* Palpifer or squama. *d5.* Stipes or stalk. *d6.* Cardo or hinge. *e.* Eyes. *f.* Base of antennæ. *g.* Throat. *h.* Mental suture.

there is a second pair of horizontally moving jaws called the *maxillæ*; these, taken in conjunction with the *palpi* or antennal-like processes that arise from them, are of very great importance in classification: the maxillæ, as a rule, are made up of the following portions:—1. The *cardo* or hinge, where the whole maxilla articulates with the head; 2. The *stipes* or stalk articulated with the cardo at a greater or less angle; 3. The *palpifer* or *squama*, the support of the maxillary palpus, the more correct term for which would be the *squama palpifera*; 4. The *lacinia* or blade, which may be regarded as the inner lobe of the maxillæ; 5. The *outer lobe*, which in the Adephaga is usually jointed (except in *Callistus* and one or two other genera) and palpiform, and is sometimes, as in *Dinentes*, entirely absent; 6. The

maxillary palpus, which is usually shaped like an antenna, and is generally 4-jointed, rarely 3-jointed, and in *Alveorchara* alone 5-jointed; these maxillary palpi vary very much in form and length: in the Pselaphidæ they are very large and curiously shaped; in the Hydrophilidæ they are very long, being in fact much longer than the antennæ; in the Curculionidæ they are short, thick, and rigid. The floor of the mouth is formed by the *mentum*: this is very variable in shape; it is usually more or less emarginate, and is occasionally furnished on each side of the emargination with a membranous border: these borders are called the *epilobes* of the mentum.

In front of the mentum is situated the *ligula*, which is sometimes corneous, sometimes membranous, sometimes partly corneous and partly membranous: it varies extremely in shape, and usually carries on each

side a membranous appendage; these appendages are termed *paraglossæ*: in many genera they are very conspicuous, projecting far beyond the ligula, but in some cases they are soldered to the sides of the ligula, and occasionally are not visible at all; from supports situated at the base of the ligula, between the ligula and mentum, arise the *labial palpi*: these are usually 3-jointed, rarely 2-jointed, and occasionally, as in *Myllena*, &c., setiform, not presenting the appearance of palpi at all. The mentum and ligula make up the *labium*: the terms *ligula* and *labium*, however, are used very loosely by many authors, who consider them as distinct from the mentum altogether, and speak of the labium as the basal portion of the organ in front of the mentum, the ligula proper being made up of the front portion, which in some cases, e.g. *Autalia*, is much extended, and appears to be distinct, but is not really so.

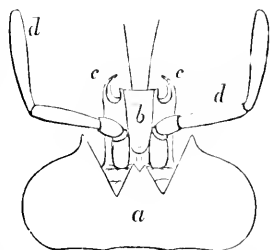
The comparative size of the joints of the labial palpi, and the number of setæ borne by them and by the anterior margin of the ligula are very useful as affording generic characters in some cases.

THE THORAX.

Throughout this work the term "thorax" is used roughly for convenience sake for the upper portion of the body between the head and the base of the elytra, the part in fact which in common language is usually called the thorax; as a matter of fact, however, the thorax is made up of three parts, the *prothorax*, *mesothorax*, and *metathorax*; the upper surfaces of these are called respectively the *pronotum*, *mesonotum*, and *metanotum*, and the under surfaces the *prosternum*, *mesosternum*, and *metasternum*: the so-called "thorax" is really the pronotum; the only portion of the mesonotum visible from above is the *scutellum*, which usually appears as a triangular or semi-circular plate between the two elytra at base, but is sometimes wanting; the metanotum is altogether hidden by the elytra.

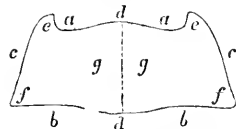
The *prosternum* bears the front pair of legs; it is often produced in a longer or shorter, sharper or blunter process between them posteriorly: this "*prosternal process*," as it is called, is often of great use in classification; the *mesonotum* and *mesosternum*, which make up the mesothorax, bear respectively the anterior pair of wings or elytra and

Fig. 9.



Labium of *Pterostichus niger*.
a. Mentum. b. Ligula. c c. Paraglossæ. d d. Labial palpi.

Fig. 10.

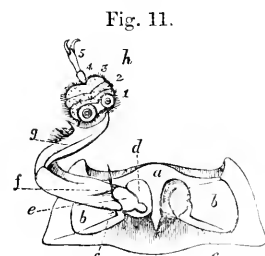


Pronotum of thorax of
D. marginalis.

a. Anterior margin. b. Posterior margin. c c. Lateral margins. d. Dorsal, central, or median line. e e. Anterior angles. f f. Posterior angles. g g. Disc.

the second pair of legs; while the *metanotum* and *metasternum* bear

respectively the posterior membranous pair of wings, and the hind legs: each of the three under portions of the thorax, the pro-, meso- and meta-sternum, is composed of three parts, the central portion called the *sternum* and two lateral pieces, the anterior of which is called the *episternum*, and the posterior the *epimeron*; these latter are very variable in size, and are seldom all visible in any one insect: both the episterna and epimera of the meso- and metasternum are often more or less hidden behind the reflexed portions



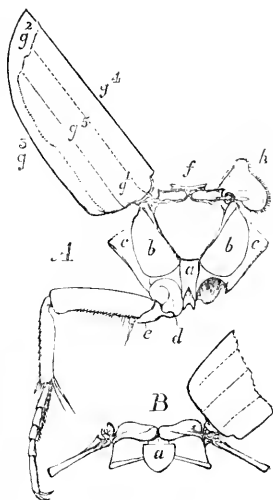
Prothorax of thorax of
D. marginalis.

a. Sternum (ending in prothoracic process). b b. Episterna. c c. Epimera. d. Coxa. e. Trochanter. f. Femur. g. Tibia. h. Tarsus (5-jointed).

of the elytra called the *epipleure*: those of the prosternum are also often hard to trace, the episterna especially being very small and sometimes invisible.

The *legs* are six in number, and are attached to the body by a joint called the *coxa*, which forms with the coxal cavity a ball and socket joint; these *coxal cavities*, sometimes called *acetabula*, are either entirely closed in front or behind by the corneous substance of one or other of the sterna, or are partially closed by one and partially by another; in the former case they are said to be closed behind, in the latter to be open behind: this character is of great importance in some families, as is also the relation of the position of the epimera to the coxal cavities: on the outer side of the anterior and middle coxae an additional piece, not connected with the legs, may be observed; sometimes it is soldered to the coxae, sometimes independently movable: this piece is called the *trochantin*, but a better name for it would be the *paracoxa*, as the term trochantin is sometimes used by continental writers as synonymous with *trochanter*; the latter term, however, has nothing to do with the former, the *trochanter* being a small and somewhat variable piece which is joined

Fig. 12.



A. Mesothorax of *D. marginalis* seen vertically.

f. Mesonotum (bearing elytra). g¹. Base of elytron. g². Apex of ditto. g³. Lateral margin of ditto. g⁴. Suture of ditto. g⁵. Disc of ditto. h. Winglet or alula (covering or a continuation of the mesothoracic spiracle). a b c. Sternum, episterna, and epimera of mesothorax (bearing middle legs). d. Coxa. e. Trochanter.

B. Mesothorax seen from above. a. Scutellum.

to the *femora* or thighs close to the coxa, and forms an integral portion of the legs : following the femora come the *tibiæ*, at the extremity of which are usually found two movable spines or spurs, which vary very considerably in length, and one of which or even both may be absent ; attached to the tibiæ come the *tarsi*, which are never composed of more than five joints or less than two ;* hence we have the old divisions of Pentamera, Tetramera, Trimeræ, &c. ; often the number of joints is different in the different feet as in the large class Heteromera, the species belonging to which have the anterior and intermediate pairs made up of five joints, and the posterior of four only : in the Staphylinidæ the variation of the number of tarsal joints affords a very valuable character for the classification of genera ; some genera, e.g. *Rhizophagus*, are heteromerous in one sex only : the tarsal joints vary very greatly in form, and are very differently dilated in the sexes of the same species ; this dilatation and the clothing of the under surface of the joints (whether pubescent, squamose, &c.) afford a most valuable character for the classification of the Carabidæ ; the last tarsal joint bears the claws, and is called the *ungueium* : the penultimate joint or last but one is often bilobed, especially in the plant and tree-frequenting beetles : the claws are of very different shapes, and may be simple, toothed, serrated, or pectinate, or furnished with membranous appendages at their base.

The different formations of the legs as a whole will be further alluded to during the course of the work : the most noticeable deviations from the ordinary form are the *natorial* or swimming legs of the Dytiscidæ, the *fossorial* or digging legs of the Scaritidæ, Geotrupidæ, &c., and the *saltatorial* or jumping legs of the Halticidæ, in which latter the femora are very strongly thickened.

THE ABDOMEN.

All that portion of the body situated behind the metasternum is called the abdomen or hind body, and consists of a series of rings divided into two portions, the dorsal segments (more or less covered by the elytra) and the ventral segments, which are united to the former on the dorsal surface, usually by membrane ; these segments are properly nine in number, but, as a rule, only five or six can be distinguished : of these segments the last dorsal segment is called the *pygidium*, and the last but one the *propygidium* ; in the Nitidulidæ and Histeridæ two or three of the apical dorsal segments are visible ; in the large family of the Staphylinidæ the upper surface of the abdomen is almost entirely uncovered.

As the terms apex and base are very often used in descriptions every student should thoroughly understand how they are employed in the case of different parts of the body, or else much confusion will arise : in the

* One or two exotic genera appear to be monomerous, but it is somewhat doubtful if they really are so ; very rarely the claws and even the anterior tarsi are wanting.

thorax the apex is the portion next the head, the base the portion next the elytra ; in the elytra the case is reversed, the apex being the posterior portion and the base the part that meets the base of the thorax ; the base of the femora is the part next the coxæ, the apex the part adjoining the tibiæ ; in the segments of the abdomen the apex is the part nearest the apex of the elytra, the base the part nearest the base of the elytra ; with regard to the tibiæ there is considerable confusion ; some authors regard the apex of the tibia as the part that meets the apex of the femur, the base being the portion nearest the tarsus ; others, however, take the opposite view. Dr. Sharp writes to me as follows : "There is a very simple means of regulating the use of the terms base and apex, and I always adhere to it myself. All the parts of the body are considered with relation to one point, the centre, to which they are supposed to be directly or indirectly attached ; the part nearest this point is the base, the part the most distant the apex : " in the following work Dr. Sharp's rule has been adhered to, except with regard to the tibiæ in the case of some genera the descriptions of which were printed before I had discussed the question with him.

EXPLANATION OF STRUCTURAL PLATES.

PLATE A.

Fig. I. *Pterostichus vulgaris*, L. (*melanarius*, Ill.) (*male*): upper side.

- | | |
|---|---------------------------|
| 1. Labrum. | 12. Scutellum. |
| 2. Labial palpus. | 13. Basal fold of elytra. |
| 3. Maxilla. | 14. Scutellary stria. |
| 4. Maxillary palpus. | 15. Suture of elytra. |
| 5. Mandible. | 16. Sutural angle. |
| 6. Antenna. | 17. Femur. |
| 7. Front of head. | 18. Tibia. |
| 8. Supra-orbital setæ. | 19. Spurs of tibia. |
| 9. Pronotum, ordinarily called
"thorax." | 20. Tarsus. |
| 10. Anterior lateral pore. | 21. Onychium and claws. |
| 11. Angular pore. | 22. Stigma. |
| | 23. Pygidium. |

Fig. II. Diagram of an imaginary beetle displaying the various portions of the under skeleton, some of which are always either absent or obsolete.

1. Gular region.
2. Collum.
3. Prosternum. *a.* episternum; *b.* epimeron.
4. Mesosternum. *c.* episternum. *d.* epimeron. *e.* paracoxa or trochantin (shown by a fine line drawn through it).
5. Metasternum. *f.* episternum. *g.* epimeron.

The paracoxa or trochantin is present in some genera, but not in others: the epimera of the prosternum are always small, and often inconspicuous or obsolete.

Fig. III. Under-skeleton of *Gyrinus*.

1. Prosternum. *a.* episternum. *b.* epimeron.
2. Mesosternum. *c.* episternum. *d.* epimeron.
3. Metasternum. *e.* episternum. *f.* epimeron.

On the first segment of the abdomen the rudiments of the suture of another segment are more or less distinctly visible.

Fig. IV. *Dytiscus marginalis*, L. (*male*): under side.

- | | |
|--|--|
| 1. 1st ventral segment of abdomen. | 4. 4th ventral segment of abdomen. |
| 2. 2nd ,, ,, | 5. 5th ,, ,, |
| 3. 3rd ,, ,, | 6. 6th ,, ,, |

- | | |
|--|---|
| 7. Prosternum terminating in
prosternal process. | support of the swimming
legs). |
| 8. Episternum of prosternum. | 16. Trochanter. |
| 9. Episternum of mesosternum. | 17. Femur. |
| 10. Epimeron of mesosternum. | 18. Tibia. |
| 11. Metasternum. | 19. Dilated tarsus, or palette, and
cupules of male. |
| 12. Wing of metasternum. | 20. Oar-shaped tarsus. |
| 13. Episternum of metasternum. | 21. Coxal process. |
| 14. Coxal cavities. | 22. Epipleura of elytra. |
| 15. Coxæ (posterior pair very
largely developed for the | 23. Genital armature. |

Figs. I. and IV. are from a plate kindly placed at my disposal by M. Bedel. Figs. II. and III. have been drawn for me by the Rev. A. Matthews.

PLATE B.

- | | |
|--|--------------------------|
| 1. Larva of <i>Chlenius vestitus</i> , Payk. | |
| 1. Antenna. | 7. Mesothorax. |
| 2. Mandible. | 8. Metathorax. |
| 3. Maxillary and labial palpi. | 9. Abdominal segments. |
| 4. Ocelli. | 10. Muscular impression. |
| 5. Leg. | 11. 11. Cerci. |
| 6. Prothorax. | 12. Anal appendage. |

The corneous plates on the segments are called the *scuta*, and are termed respectively the *dorsal* and *abdominal scuta*.

II. Larva of *Gyrinus marinus*, Gyll.

III. Larva of *Haliphus fulvus*, F.

IV. Pupa of *Sphæridium scarabæoides*, F.

1. Cephalic region.
2. Thoracic region.
3. Abdominal region. *e. cerci*.
4. One of the "styli motorii."

Fig. V. Under skeleton of *Cyphrus*. 1. Epimeron of mesothorax. 2. Ante-coxal piece (see p. 1). 3. Episternum of metathorax. 4. Anterior coxa.

Fig. VI. Under skeleton of *Pterostichus* (numbered as preceding).

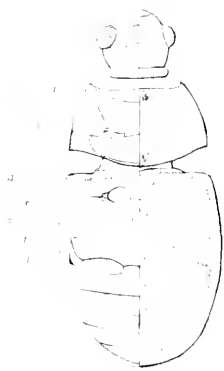
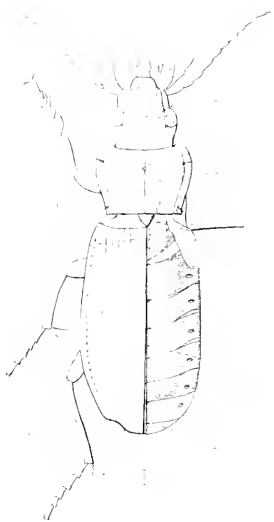
Fig. VII. " " *Mormolyce* " "

Fig. VIII. " " *Dytiscus*. 1. Epimeron of mesothorax. 2. Metasternum, showing absence of ante-coxal piece. 3. Episternum of metathorax. 4. Anterior coxa.

Fig. IX. Under skeleton of *Haliphus* showing the broad plates that cover a great portion of the abdomen: the parts indicated by dotted lines are covered and concealed by the plates: 1. Ante-coxal piece. 2. Abdominal plates. 3. Anterior coxa.

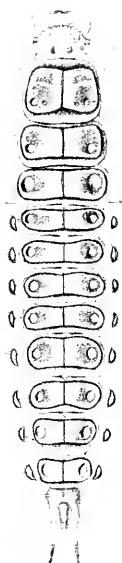
Fig. X. Under skeleton of *Pelobius* (numbered as Figs. 5, 6, 7).

Figures I., II., and III. are after Schiödte, the rest after Horn.



II





COLEOPTERA.

ADEPHAGA.

(*CARNIVORA—FILICORNIA.*)

THE classification of this series has always been attended with considerable difficulty, and cannot yet be said to be settled. The best method appears to be that adopted by Dr. G. H. Horn, in his essay on the genera of Carabidæ, published in the Transactions of the American Entomological Society for 1881.* Dr. Sharp (Trans. Ent. Soc. London, 1882, i. 61) suggests certain alterations in the system; the most important of these are included in the table given below. The series contains only a few families, the members of which are, as a rule, active; in habits they are predaceous and carnivorous. Part of them are terrestrial and part aquatic, and in conformity with their habitat many authors divide them into two groups, styled respectively Geodephaga and Hydradephaga. It is, however, better to treat them as a whole. For further particulars the student of the group would do well to consult the papers above referred to, the section Carabidæ by Mr. Bates lately published in the "Biologia Centrali-Americana," and the work of Dr. Sharp "On Aquatic Carnivorous Coleoptera or Dytiscidæ" published in the Transactions of the Royal Dublin Society for 1882.

In the following table the comparatively recently discovered North American family, Amphizoidæ, is included as forming a strong connecting link and transition between the ordinarily received sections of the series.

- | | |
|---|--------------|
| I. Metasternum with an ante-coxal piece, separated by a well-marked suture, reaching from one side to the other, and extended triangularly between the hind coxæ. | |
| i. Antennæ eleven-jointed; posterior coxæ free and simple; habits terrestrial. | |
| 1. Clypeus extending laterally on both sides in front of and beyond the insertion of the antennæ | CICINDELIDÆ. |
| 2. Clypeus not extending so far towards the sides as the insertion of the antennæ | CARABIDÆ. |
| ii. Antennæ ten-jointed; posterior coxæ fixed and furnished with large plates, covering a great portion of the abdomen; habits aquatic | HALIPLIDÆ. |
| II. Metasternum with a very short ante-coxal piece, the suture indistinct, not prolonged posteriorly between the hind coxæ; habits aquatic. | |

* This observation applies only to Dr. Horn's general arrangement of the families of the Adephaga, and not to his detailed classification of the Carabidæ.

- | | |
|---|--------------|
| (1. Legs not adapted for swimming; anterior coxæ globular . . . | AMPHIZOIDÆ.) |
| 2. Legs adapted for swimming; anterior coxæ conical . . . | PELOBIIDÆ. |
| III. Metasternum prolonged behind in a triangular process, the ante-coxal piece entirely wanting; habits aquatic. | |
| 1. Antennæ slender, filiform; abdomen with six segments; eyes two | DYTISCIDÆ. |
| 2. Antennæ irregular, very short; abdomen with seven segments, the first two closely united; eyes four | GYRINIDÆ. |

The above table is perhaps the best classification of the Adephaga that can be adopted in the present state of our knowledge. As, however, a more simple division may be of advantage to the general student, the following table is added. In this the Pelobiidæ are classed for convenience sake with the Dytiscidæ.

- | | |
|---|--------------|
| I. Intermediate legs adapted for walking; two eyes only present. | |
| i. Upper joints of the antennæ pubescent. | |
| 1. Clypeus extending laterally on both sides in front of the insertion of the antennæ | CICINDELIDÆ. |
| 2. Clypeus not extending so far towards the sides as the insertion of the antennæ | CARABIDÆ. |
| ii. Antennæ entirely glabrous, without pubescence. | |
| 1. Antennæ ten-jointed; posterior coxæ furnished with large plates, covering a great portion of the abdomen | HALIPLIDÆ. |
| 2. Antennæ eleven-jointed; posterior coxæ without plates | DYTISCIDÆ. |
| II. Intermediate legs oar-shaped, adapted for swimming; four eyes present, two on the upper surface of the head, and two on the under surface | GYRINIDÆ. |

CICINDELIDÆ.

Head large, eyes prominent; maxillæ with the outer lobe two-jointed, the inner usually terminated by an articulated hook; antennæ eleven-jointed, inserted on the forehead above the base of the mandibles; clypeus extending laterally in front of the insertion of the antennæ; elytra covering abdomen; abdomen with the three anterior segments connate, with six ventral segments visible in the female, and seven, as a rule, in the male; legs slender, formed for running; posterior coxæ dilated internally, not reaching the sides of the body; all the tarsi five-jointed. This family is represented in Europe by two genera, *Tetracha*, which is nocturnal and crepuscular in its habits, and *Cicindela*, which frequents the hottest and most sunny places; the nocturnal *Manticora* (*Manticora*, *Omus*, &c.) also belong to it. The species belonging to this family found in temperate climates are all terrestrial in their habits, but many species occurring within the tropics alight on the leaves of trees.

CICINDELA, Linné.

The species belonging to this genus are the most predaceous of the Coleoptera, and the most active; they are also among the handsomest and most brightly coloured. From the ferocity of their nature, as well as from the spots and stripes with which they are ornamented, they have been called Tiger beetles. They inhabit for the most part hot sandy

districts; they run and fly with great swiftness in the sunshine on the open ground or among grass. About four hundred species have been described, of which only four have been found in Britain.

The larva of *Cicindela hybrida* is fully described and figured by Schiöde (De Metamorphosi Eleutheratorum Observationes, Part iii., p. 160, Pl. xii. 1). It is pale testaceous with the head and thorax fuscous with a green and purple metallic tinge, and with the femora, tibiae, and tarsi fuscous; the head is large and produced in front of the eyes, and the prothorax is narrow and crescent-shaped with the anterior angles produced; the abdominal shields are separated except on the ninth segment, and there are no cerci; on the fifth segment which is raised there are two bent hooks, and the anal segment is cylindrical and furnished with short spinose cilia.

The larva of *C. campestris* much resembles this, but is more robust. It is figured by Westwood (Classif. i., p. 50), who says that these larvae burrow cylindric retreats in the earth to the depth of a foot or more, employing their legs and jaws in loosening the particles of sand and earth which they carry to the surface on their broad saucer-like head, ascending by the assistance of the two hooks which they bear upon their back. Having completed the burrow, they station themselves by means of their legs and dorsal hooks at its mouth, their large flattened head and first segment fitting the hole. Here they lie in wait for such insects as may be crawling about, and seize and drag them to the bottom of the burrow, to which also they retreat on the first approach of danger.

Our species may be readily distinguished as follows:—

- I. Labrum and head unicolorous, elytra with larger punctures near suture *C. SYLVATICA*, L.
- II. Labrum whitish yellow, elytra without larger punctures near suture.
 - i. Thorax transverse; form not cylindrical.
 1. Elytra varying from light green to dark green or almost black with five marginal white spots and one white spot just behind centre of disc, the latter surrounded with a darker shade *C. CAMPESTRIS*, L.
 2. Elytra dark bronze brown with three irregular white bands, the middle one simply waved, forehead gibbous in front *C. HYBRIDA*, L.
 3. Elytra dark bronze brown with three irregular white bands, the middle one bent downward from centre towards apex of elytra; forehead not gibbous in front *C. maritima*, Dej.
 - ii. Thorax elongate; form cylindrical *C. GERMANICA*, L.

C. sylvatica, L. Bronze-brown with a purplish tinge; labrum large, concolorous with head, with a distinct tooth in the middle of anterior margin, and with a strong longitudinal keel on disc; thorax rather finely rugose; elytra long oval, longer in proportion than in the succeeding species, variolose, thickly punctured, with a spot at shoulder, another oblique marking before middle, a round spot before apex, and an irregular band just behind middle, white or very light testaceous; none of these except the humeral spot touch the margin; underside of legs and body clothed with white hairs, the former metallic. L. 14–16 mm.

Local, but common where it occurs; sandy heaths; Claygate, Woking, Chobham, Weybridge; Bournemouth; also near Cambridge.

C. campestris, L. Colour varying from bright grass green to almost black; base of antennae, anterior and posterior margins of tho-

rax, margins of elytra and chief part of legs brilliant coppery red; elytra ovate, much wider than thorax, finely shagreened with five white markings on each; under surface of abdomen shining green, of thorax and breast coppery red except in middle; legs pilose, tarsi green; in the female there is nearly always a small black spot near suture towards base, which is obsolete in the male. L. 11–15 mm.

Common and generally distributed in sandy places, especially in spring and early summer, throughout the kingdom. The *var. funebris* is almost black, and is found very rarely in the Clyde district of Scotland (Loch Long, &c.); in the Isle of Wight there is a dark dirty green variety, which is common in April. In the last European catalogue (Heyden, Reitter, and Weise, 1883) seventeen named varieties are mentioned.

C. hybrida, L. Brownish or greenish bronze with purplish reflection; thorax quadrate, scarcely narrowed behind, sides clothed with long white hairs; elytra more coarsely shagreened than in *C. campestris*, granulated, with three irregular white bands on each at shoulder, apex, and in middle, the latter simply waved; underside purplish green with the breast and sides of thorax coppery red; legs metallic (red, green, and purple), very pubescent, tarsi greenish or purplish. L. 12–15 mm.

Local; Wallasey and Crosby sandhills, Cheshire and Lancashire; Swansea, Crymlyn Burrows; also found in North Wales; coast of Bristol Channel; Yarmouth; one specimen only has been recorded from Scotland, Glenfarg, Tay district.

V. maritima, Dej. Very like the type, but smaller and more slender as a rule, and rather more variable in colour. It is easily distinguished by the white central band on elytra being strongly deflexed and produced towards apex. L. 12 mm.

Local; sandy coasts; Devonshire; Dorset; Hants; South Wales; Burnham, Somerset; Burnham Market, Norfolk; Cleethorpes, Lincolnshire; Birkenhead and Wallasey.

C. germanica, L. (*Cylindrodera germanica*, Westwood). Elongate, almost cylindrical, bright green, bluish green, olivaceous, or black; thorax long, narrow, and cylindrical; elytra narrowed in front, widest towards apex, with three rather variable white spots on each, one at the humeral angle, a larger one about middle near to but not touching margin, and a third, crescent-shaped, stretching along margin of apex; underside green or purplish-green, sides of thorax and breast coppery; legs greenish, tibiae testaceous. L. 10 mm.

Black Gang Chine, Isle of Wight; also recorded by Dawson from Dorset, and by Stephens from Darent Wood, and from Devonshire. This species is found among grass, and flies very rarely, and then close to the ground; it runs, however, with very great rapidity. It is very local and rare, and, in fact, Black Gang Chine appears to be the only locality in which it is now taken.

CARABIDÆ.

Head usually narrower than thorax; maxillæ with the outer lobe almost always two-jointed, the inner usually curved, acute, set with cilia, or spines; antennæ inserted behind the base of the mandibles, elypeus not extending laterally in front of insertion of antennæ; abdomen with the three anterior segments connate or soldered together, usually with six ventral segments visible in both sexes, occasionally seven or

eight (Brachinina); legs slender, formed for running, posterior coxæ dilated internally, hardly ever reaching the sides of the body.*

This family is one of the most numerous of the Coleoptera in point of species, and one of the most predaceous; a few species, e.g. *Zabrus gibbus* and *Amara spinipes*, are, in part at least, vegetable feeders.

- I. Mesothoracic epimera reaching the middle coxal cavities which are not entirely enclosed by the sterna CARABINÆ.
- II. Mesothoracic epimera not reaching the middle coxal cavities which are entirely closed by the sterna HARPALINÆ.

CARABINÆ.

- i. Anterior coxal cavities open behind.
 - 1. Mandibles without setigerous puncture CARABINA.
 - 2. Mandibles with setigerous puncture NEBRINA.
- ii. Anterior coxal cavities closed behind.
 - 1. Antennæ free at base; legs not fossorial.
 - A. Mandibles without setigerous puncture; anterior tibiæ feebly emarginate; head with two supra-orbital setæ ELAPHRINA.
 - B. Mandibles without setigerous puncture; anterior tibiæ strongly emarginate; head with one supra-orbital seta LORICERINA.
 - 2. Antennæ inserted under a frontal plate; legs fossorial SCARITINA.

CARABINA.

- I. Posterior coxæ separated; labrum prolonged and bifurcated, presenting a rostrate appearance CYCHRUS, Fabr.
- II. Posterior coxæ contiguous; labrum not prolonged, simply emarginate.
 - 1. Mandibles smooth; 2nd joint of antennæ longer, 3rd joint cylindrical CARABUS, Linn.
 - 2. Mandibles striated; 2nd joint of antennæ short, 3rd joint compressed CALOSOMA, Weber.

CYCHRUS, Fabricius.

The genus *Cychrus* comprises a considerable number of insects of dark colour, and somewhat peculiar appearance, owing to the rostrate appearance of the head; some species, however, are more brightly coloured, and are metallic. The European species are not as numerous as the North American. According to M. Bedel they attack land molluscs by introducing their long head into the mouth of the shells. Some of the species have the power of stridulating by rubbing the abdomen against the elytra. We possess but one species as British.

The larva of *Cychrus rostratus* is figured by Westwood (Classif. i., p. 67, Fig. 2, 3), and more correctly by Schiödte (Part iii., Pl. xviii. 1). It is very distinct, being shorter and much broader in proportion than is usual in the Carabidæ, the term oniseiform (or like a wood-louse) well expressing its shape; it is of a castaneous colour with margins lighter; the head is narrow in proportion to the thorax, which is much narrower in front than behind; the anal segment is very short with the hinder angles prominent.

C. rostratus, L. Colour deep black; head very narrow and elongate; thorax truncate in front, with sides rounded, widest about $\frac{1}{2}$ middle, and thence contracted to base; base with deep transverse impression;

* The only exception to this rule at present known is found in the tribe Trachypachina.

† In this point the species is somewhat variable, being sometimes widest before middle, although usually widest in middle.

elytra wide, oval, and convex, granulated; legs elongate. Occasionally the elytra present traces of three interrupted lines. L. 16 mm.

Widely distributed, though seldom met with in abundance in any one spot. Found under refuse in woods, and in sand and gravel pits; not common in Scotland, Lowlands only; Ireland, near Belfast, Armagh, and Carlingford.

CARABUS, Linné.

The genus *Carabus* is one of the largest of the family of Carabidæ, and comprises over 300 species, which have a very wide range in both the Old and New Worlds. For the most part they are large, and many of them are exceedingly beautiful, owing to the brilliancy of their metallic colouring. They are found under stones and bark, in moss or rotten wood, and are, as a rule, nocturnal in their habits. The commoner species are often found crushed in roads and pathways in the morning. They are exceedingly predaceous, and feed on other insects, molluscs, and even earth-worms. In common with other Carabidæ, they have the power of ejecting an acrid and caustic fluid from the anus for purposes of defence. The genus is, as a rule, apterous, and the elytra are very often soldered together. The common *C. granulatus*, however, has the elytra free, and possesses long rudimentary wings, which reach beyond the hind coxæ.

The larvæ of *Carabus intricatus*, *violaceus*, and *cancellatus* are figured by Schiödte (Part iii., Pl. xvii., 1, 5, 9). They are rather elongate, with the segments of thorax and abdomen of about equal breadth, those of latter becoming narrower towards apex, and the prothorax being somewhat narrowed in front. The larva of *C. intricatus* differs considerably from the other two, the head being larger, and the abdominal segments broader and gradually wider behind. The cerci also, although short, are much longer than in the other species. This fact would seem to indicate that *C. intricatus* rightly belongs to another genus (*Chatocarabus*, Thoms.). Westwood describes and figures the larva of *C. auronitens* (Classif., vol. i., p. 67). The pupa, he says, is of an ordinary form, with the abdominal segments rounded at the sides, and furnished on each side with a bunch of hairs; the anal segment is terminated by two conical appendages. These larvæ are very voracious.

I. Elytra with no distinct raised ribs.

- i. Elytra very strongly rugose longitudinally, without rows of large punctures; thorax at least as long as broad . . . *C. INTRICATUS*, L.
- ii. Elytra rather strongly rugose or granulate, with three somewhat obscure rows of large punctures; thorax broader than long *C. CATENULATUS*, Scop.
- iii. Elytra finely rugose, granulate, or striated.
 1. Elytra with rows of round shallow pores or impressions.
 - A. Colour bronze. Length 20-24 mm. *C. NEMORALIS*, Müll.
 - B. Colour black. Length 14-16 mm. *C. CONVEXUS*, F.
 2. Elytra without larger pores or impressions.
 - A. Elytra without metallic side border; thorax strongly transverse *C. GLABRATUS*, Payk.
 - B. Elytra with metallic (usually blue or red) side border; thorax variable, slightly or not at all transverse *C. VIOLACEUS*, L.

II. Elytra with three distinctly raised ribs.

- i. Interstices between ribs filled with regular rows of large round metallic impressions *C. CLATHRATUS*, L.

ii. Interstices without impressions.

1. Interstices very finely wrinkled, almost smooth ; legs red *C. AURATUS*, *L.*
2. Interstices more coarsely wrinkled ; legs black *C. NITENS*, *L.*

III. Elytra with three rows of oblong raised granules separated from each other by a single plain ridge, or by rows of three more or less raised lines.

- i. Ridges single and plain *C. GRANULATUS*, *L.*
- ii. Ridges replaced by three plainly raised lines which may be traced almost to apex *C. MONILIS*, *F.*
- iii. Ridges replaced by three rather obsolete raised lines which are confused and evanescent towards apex *C. ARVENSIS*, *F.*

C. intricatus, *L.* Blue or violet-blue ; head large, forehead rugose ; thorax long, sinuate before base, transversely rugose, with a deep central furrow ; elytra long, sides dilated behind middle, strongly sinuate before apex ; legs black, long and slender. L. 24–28 mm.

In woods under moss and lichens on trunks of old oaks and other trees, or under bark. Apparently confined to the south-west district bordering on Dartmoor in Devonshire ; Tavistock, Holdsworth, Ashburton, Bickleigh Vale. About 60 or 70 specimens were taken in this district by Mr. Reading, of Plymouth, some years ago. One specimen, probably accidental, has occurred in a stable at Croydon.

C. catenulatus, *Scop.* Black, margins of thorax and elytra bluish or reddish-violet ; head obsoletely punctured and strigose ; thorax with lateral margins broad and strongly elevated throughout, dorsal line very shallow ; elytra rugose with sixteen or seventeen elevated interrupted lines on each ; underside of body and legs black. L. 20–24 lines.

Common and widely distributed in England and Scotland, both in lowland and mountainous districts. Local in Ireland, near Belfast and Dublin.

C. nemoralis, *Müll.* (*hortensis*, *Panz.*). Head black, much narrower than thorax ; antennæ fuscous with base black ; thorax bronze or purplish black with lighter metallic margins ; elytra rather broad, oblong ovate, brassy, coppery, or green, with three series of large metallic punctures, the rest of the body rugose ; underside and legs black. L. 20–24 mm.

Common and widely distributed in England and Ireland. Abundant in Scotland, Lowlands only.

C. convexus, *F.* Somewhat like *C. glabratus*, but much smaller, deep black with the margins of thorax and elytra more or less cyanous ; head with a deep impression on each side ; thorax nearly quadrate, plainly but rather shallowly rugose with fine central furrow ; elytra short, ovate, closely and regularly striated, with narrow elevated interstices ; underside black. L. 14–16 mm.

Very doubtful as British. Mr. Matthews has a specimen said to have been taken by Holme in Winstanley Park, Lancashire, in Sept. 1836, but its authenticity appears very doubtful. There is, however, no specimen existing that is more authentic, and the best plan would be to strike the species provisionally off the British list.

C. glabratus, *Payk.* Entirely black, smooth ; head with a

fovea on each side behind antennæ; thorax transverse, rugose, with central furrow almost obsolete; elytra oblong-ovate, very convex, finely rugose longitudinally; underside of body shining black, sides rugose; legs black. L. 22-24 mm.

A mountain species. North Wales, Snowdon, Cader Idris. Hills above Langdale, Westmoreland. Scotland, Rannoch, Braemar, Mull, &c. Ireland, near Belfast, Lough Bray. Always a local and scarce insect.

C. violaceus, L. Elongate; head black; thorax varying in size, sometimes distinctly transverse, sometimes as long as broad, with rather obsolete central furrow; disc transversely rugose, black with lateral margins cyaneous or violaceous; elytra elongate, narrow at shoulders, broader behind, finely rugose or granulate, black with margins bright red, blue, purple, or coppery; underside and legs black. L. 24 mm.

Common in England and Scotland; apparently local in Ireland; Armagh, Antrim. The insects that have been introduced as *C. purpurascens*, F., are a variety of this species.

The var. *exasperatus* found in the Isle of Portland, New Forest, &c., is very distinct. The granulation of the elytra is much coarser, and they exhibit traces of raised lines more or less distinct. Mr. Mason, of Burton-on-Trent, and Mr. J. J. Walker have lately taken examples of this variety in the old locality.

C. clathratus, L. Head black with an oblong furrow on each side; thorax short with a plain central furrow, disc brassy black; elytra wide and convex, greenish or brassy or sometimes blackish, with three ribs on each; interstices with deep round red or golden impressions; underside and legs black. L. 22-28 mm.

Said to have occurred in Norfolk in 1809 (Steph.). Scotland local, but rather widely distributed Lowlands and Highlands, Clyde, Argyle, Dee, Sutherland; abundant in Mull, Hebrides, &c. Ireland, Enniskerry; Teelin Bay, Donegal; Westport.

C. auratus, L. Colour brilliant metallic green with a golden reflection; mouth and first four joints of antennæ yellow or reddish yellow; thorax broad, very transverse; elytra strongly emarginate just before apex, with three raised ridges on each, interstices almost smooth; legs red, femora often darker. L. 20-22 mm.

Very abundant in France, where it does great service in destroying the grubs of the cockchafer. Very doubtfully indigenous in Britain. Examples are often taken in and near the London markets, that have evidently been imported with vegetables, &c. A small colony was found in 1863 by Dr. Power and Mr. Brewer, between Hythe and Sandgate, under circumstances that seemed to prove them natives, but as Mr. Walton had some years before turned a batch loose at Dover, in the hope of their establishing themselves, they may have owed their origin to these. Recorded also from Lough Bray in Ireland, but very doubtful, and also from the banks of a tributary of the Clyde, near Glasgow. (Vide Ent. Ann., 1864, 32.)

C. nitens, L. The smallest but perhaps the handsomest of the British Carabi; head and thorax as a rule brilliant coppery-red, sometimes greenish; elytra shining metallic green with bright coppery

margins, and suture and three raised ribs on each black or obscurely brassy; underside and legs black. L. 14–16 mm.

New Forest (Brockenhurst, &c.), Bournemouth, Poole; Yorkshire; North Lincolnshire; Cannock Chase; Charnwood Forest; Durham. Scotland local, Arran, Ayrshire. Ireland, near Belfast. Usually found on heaths and commons.

C. granulatus, L. (*cancellatus*, Steph. Cat.). Rather depressed, fuscous brassy, greenish, or almost black, occasionally slightly violaceous; head narrow, finely punctured; thorax transverse with central furrow distinct; elytra almost parallel-sided until towards apex, each with three elevated lines divided by rows of large oblong granules; underside and legs black. L. 16–20 mm.

Marshy places, in rotten willows, or under pond refuse; common and widely distributed throughout the kingdom.

Next to this species comes *C. cancellatus*, Ill. (*granulatus*, Steph. Cat.) (fig. Steph. Ill. Pl. iv. 1), distinguished by its larger size, more convex elytra, brighter colouring, larger granules on elytra, and by having the femora and first joint of antennæ red. Although recorded as British, it is a very doubtful species, and requires further confirmation.

C. monilis, F. Green, coppery, or occasionally entirely violaceous or even blackish; thorax with sides very little rounded and plain central furrow; elytra with three rows of granules separated from one another by three raised lines; underside and legs shining black. L. 22–26 mm

Common and generally distributed in the middle and south of England; also recorded from the northern counties. Scotland, only once recorded by Murray as from Granton, near Edinburgh. Ireland, near Dublin and Armagh.

The var. *consitus* differs from the type in having the central of the three lines that separate the rows of granules on the elytra more strongly raised, and the two others obsolete. It is rather rare, but has occurred at Dover, Chatham, Tonbridge, and other places.

C. arvensis, F. Smaller than the preceding species; colour very variable, greenish, reddish, coppery, violaceous, or dark brassy; thorax narrower than in the preceding species, with the sides more contracted behind middle; elytra with three rows of granules on each separated by three raised lines, which are much less elevated and more obsolete than in *C. monilis*; underside and legs black. L. 16–20 mm.

Local, but not uncommon in spring on sandy heaths. Wimbledon Common, New Forest, Dean Forest, Bournemouth, Derbyshire Moors, Charnwood Forest, Snowdon, Lake District. Scotland common, Highlands; local near Glasgow. Ireland, near Belfast; Rathmullan, co. Donegal.

CALOSOMA, Weber.

This genus comprises a considerable number of species, which are widely distributed throughout the world. In Europe, however, the number of species of *Curabus* far exceeds that of *Calosoma*. In North America the reverse is the case, although the disproportion between the

genera is not nearly so marked. The species are easily distinguished by their peculiar facies, which is due to their short transverse thorax and very broad and comparatively short elytra. They possess ample wings. Some species live in the open country, but as a rule they are found on trees in woods where they hunt their food, which consists largely of the larvæ of Lepidoptera. There is nothing remarkable about the larvæ, which much resemble in form those of *Carabus*; that of *C. sycophanta* is black, subdepressed, and fleshy, with the upper surface of each segment and the head more scaly; the last segment bears two horny spines. In France they feed voraciously on the larvæ of the Processionary caterpillar, the ravages of which they are very useful in checking. They will also devour one another.

Lateral border of thorax obliterated before base; male with the first four joints of the anterior tarsi pubescent beneath . . . *C. inquisitor*, L.
 Lateral border of thorax prolonged to base; male with the first three joints of anterior tarsi pubescent beneath *C. sycophanta*, L.

C. inquisitor, L. Head coppery, sometimes greenish, produced in front; thorax very short, dilated at sides, and contracted towards base, coppery with greenish margins, rugose, with central furrow, and two large foveæ at base; elytra broad, dilated behind, coppery with brilliant green margins, regularly striate longitudinally, and irregularly striate horizontally, presenting the appearance of being divided into a number of small raised squares; each elytron with three series of pores; underside greenish and coppery; legs black. L. 16–20 mm.

On oaks in woods, sometimes at sugar; Dean Forest; Buddon Wood and Seal Wood, Leicestershire; New Forest; Bagley Wood, Oxon; Darent Wood; recorded by Stephens from Norwood and Dulwich; Ireland, Powerscourt; not recorded from Scotland.

C. sycophanta, L. Head small, blue black, extended in front; thorax very short, strongly rounded at sides and contracted towards base, dark green with a bluish or violaceous tinge, with shallow central line and shallow foveæ at base; elytra rich golden green with coppery reflections, very broad, somewhat acuminate towards apex, deeply striated, interstices with transverse scratches, with three series of large impressions on the third, seventh, and eleventh striæ; underside of a dark bluish colour; legs black. L. 22–28 mm.

This beautiful species is not really a native, but only an occasional visitant; it has been found rather often on the south-east coast at Deal, Dover, Folkestone, Herne Bay, and Gravesend; it has also occurred in the Isle of Wight and at Plymouth; one example was recorded from the Irish coast in 1815, but this is very doubtful. My specimen was taken at Hastings in 1858, running on the pathway, by a collector living in the place.

NEBRIINA.

- I. Sutural stria of elytra widely separated from second; head with eyes very large, forehead and clypeus sulcate . . . *NOTIOPHILUS*, Dum.
- II. Inner striæ of elytra equidistant; head normal, forehead and clypeus simple.

- i. Mandibles dilated at the sides into a horizontal plate, maxillæ at base furnished with spine-bearing processes LEISTUS, Fröhl.
- ii. Mandibles stout, not dilated at the sides, maxillæ merely setose at base.
 - 1. Anterior tarsi of male feebly dilated NEBRIA, Latr.
 - 2. Anterior tarsi of male broadly dilated PELOPHILA, Dej.

NOTIOPHILUS, Duméril.

The genus *Notiophilus* includes a number of small, bright bronze insects, remarkable for their large eyes, sulcate heads, and the smooth space near the suture of the elytra; they run very swiftly. Two or three of the species are among our commonest insects, and may be seen from early spring to late autumn running on the roads or pathways in the open country or in damp places in woods. M. Bedel (*Faune des Coléoptères du bassin de la Seine*, p. 18) raises this genus to the rank of a tribe.

The larva of *Notiophilus biguttatus* is figured by Schiödte (iii. Pl. xiii. 12). The head is long and large and produced in front, with very long and powerful mandibles; the anterior part of the clypeus is produced into a bifurcate horn; the prothorax is subquadrate, somewhat narrower than the head; the rest of the segments are of about equal breadth, becoming gradually narrower behind until the ninth, which is much narrowed, and bears two long pilose cerci; the upper surface is somewhat scabrose, and the corneous portions are finely reticulate and furnished scantily with short setæ. These larvæ are very active; according to Schiödte the larva of *N. biguttatus* may often be seen running on the trunks of trees in the sunshine; that of *N. aquaticus* lives in damp places near lakes and rivers, and in general appearance much resembles a small *Pæderus*.

- I. Apex of elytra obscurely yellow.
 - i. Sides of thorax sinuate towards base; elytra with one pore only on the middle third.
 - 1. Form broader; punctuation stronger *N. BIGUTTATUS*, F.
 - 2. Form narrower; punctuation weaker *N. SUBSTRIATUS*, Wät.
 - ii. Sides of thorax straight; elytra with two pores on the middle third *N. QUADRIGUTTATUS*, Dej.
- II. Apex of elytra without trace of yellow colour.
 - i. Tibiæ entirely dark bronze *N. AQUATICUS*, L.
 - ii. Tibiæ testaceous.
 - 1. Apex of elytra shining; femora entirely dark bronze *N. PALUSTRIS*, Duft.
 - 2. Apex of elytra dull; femora broadly reddish *N. RUFIPES*, Curt.

N. biguttatus, Fab. Shining bronze above, greenish black beneath, rather more depressed and parallel than the other species, except *N. substriatus*; antennæ with first four joints reddish; thorax short with the sides very slightly rounded immediately below the anterior angles, and then obliquely sloped towards the base, which is broader than in the other species; elytra broad, sides parallel, with striae continued to apex, each with three impressions between the second and third striae, one of which is at the base, another at apex, and the third near the middle; legs bronze black, tibiæ more or less testaceous. L. $1\frac{1}{2}$ –5 mm.

Abundant everywhere throughout the kingdom.

N. substriatus, Wat. (*biguttatus*, var. γ , Daws.). Resembles the preceding, but is smaller and narrower with the punctuation much feebler, the punctured striae being sometimes nearly obsolete, or even entirely obliterated before apex; the interstices between the suture and the first, and between the second and seventh striae are exceedingly finely shagreened, which gives an opaqueness to those parts contrasting strongly with the broad glabrous space between the first and second striae; the colour invariably is lighter and more brassy. L. 4 mm.

Local, but widely distributed, and probably very often overlooked; Croydon and other places in the London district; Deal; Repton; Lincoln; Devonshire; Scotland, local Lowlands, Kircaldy, &c.

N. quadriguttatus, Dej. Resembles *N. biguttatus*, of which it is commonly considered to be a variety, but differs by having two pores on the middle third of the elytra instead of one, placed near one another; this, however, is not always a constant distinction, for specimens have been recorded which have two pores on one side and one on the other; the thorax, however, has the sides almost straight to base, and is more strongly sculptured than in *N. biguttatus*, which has the sides of the thorax more or less plainly sinuate. L. $4\frac{1}{2}$ mm.

Rare. Sandy places. West Wickham; Tunbridge Wells; Redhill; Reigate.

It is yet a question whether this may not be an uncommon variety of *N. biguttatus*, as the latter has the thorax rather variable in shape; it seems, however, to have as good a claim to specific rank as *N. substriatus*.

N. aquaticus, L. Brassy, occasionally dark bluish-black; antennae black with basal joints red beneath; thorax broadest in front with sides very slightly rounded and sinuate; elytra oblong, much wider than thorax, sides somewhat parallel; striae well marked, gradually becoming feebler behind middle, two only being carried to apex; between the third and fourth there is a deep pore a little before middle, and there is also a smaller one at apex. Legs entirely dark bronze. L. $4\frac{1}{2}$ mm.

Common and widely distributed.

N. palustris, Duft. Closely resembles the preceding, with which it was united by Gyllenhal and Dejean; it is, however, shorter and narrower; the antennae have the three basal joints entirely testaceous; the thorax is shorter with the sides more rounded in front and more contracted behind, and the lateral margins and base less depressed; the elytra are shorter and very distinctly narrowed in front, and the tibiae are testaceous. L. 4 mm.

Rather local, though by no means uncommon in England; local in Scotland, Lowlands; Ireland, common near Dublin. Usually common where it occurs.

N. rufipes, Curt. Rather more coppery than the other species of the genus; thorax rather strongly contracted behind; elytra very smooth, slightly ochreous and dull at apex; striae of elytra well marked, continued to apex; between the second and third striae there is a deep

pore, and another near apex; antennæ and legs pale ferruginous, base of former lighter than the remainder. L. $4\frac{1}{2}$ mm.

Rare. London district: Highgate, Lewisham, Shirley, Greenwich Park, Darent, Gravesend; Coombe Wood; Reigate; Tonbridge; Walton-on-Naze; Colchester; Hunstanton.

LEISTUS, Fröhlich.

The species of *Leistus* as a rule inhabit cold and mountainous countries, although some are found in warmer latitudes; they are found at the roots of trees and under stones and bark, and are often taken by sweeping in damp places; their most notable characteristic is the peculiar formation of the maxillæ and ligula, the latter being prominent, narrowed at the top, and then trifurcate. We possess about a quarter of the European species.

The larvæ of *Leistus rufomarginatus*, *rufescens*, and *ferrugineus*, and the pupa of *L. rufescens*, are figured by Schiödte (iii., Pl. xv. Fig. 1, 2, 7, 10). The head is large with long and slender mandibles, and is joined to the thorax by a narrow neck; the clypeus is produced into a strong bifurcate horn, bearing spinous processes; the prothorax is longer than broad, narrowed in front; the dorsal shields of the meso- and meta-thorax are very convex with large muscular impressions, those of the abdominal segments flatter with a small round impression on each side; the anal process varies in the species, being larger in *L. rufescens* than *L. spinibarbis*; the cerci and legs are long and rather slender; the colour varies in the several species, being pale, with the shields more or less dark, with or without a metallic reflection.

I. Upper side metallic (bluish or greenish).

i. Lateral margins of thorax broad.

1. Extreme edge of lateral margins of thorax red . . . L. SPINIBARBIS, F.

2. Lateral margins of thorax entirely red . . . L. MONTANUS, Steph.

ii. Lateral margins of thorax narrow . . . L. FULVIBARBIS, Dej.

II. Upper side not metallic (reddish or pitchy).

i. Head and thorax concolorous . . . L. FERRUGINEUS, L.

ii. Head black . . . L. RUFESCENS, F.

L. spinibarbis, F. Broad and rather flat; colour bright blue, sometimes with a greenish tinge; thorax with the sides dilated and rounded in front, contracted behind, with a distinct impressed central line, disc smooth, margins all punctured; elytra wide, rounded at apex, with deep punctured striae; underside black, legs black, tarsi red; in immature examples the legs and margins of thorax are entirely red. L. 8 mm.

Widely distributed throughout the country, in the northern as well as the midland and southern districts; not recorded in the Scotch list; Ireland, near Belfast.

L. montanus, Steph. Very like the common *L. fulvibarbis*, but known at once by its more elongate structure, and especially by the form of the thorax (fig. Dawson, Geol. Brit. i., Fig. 5), which is narrower, more depressed and elongated; the lateral margins are wider and are entirely red; the elytra are brighter blue, longer in proportion, with sides more parallel, and more finely striated and punctured; legs red, dusky at apex of femora. L. 7 mm.

A rare species, attached to mountainous districts. Lake district, Cumberland, &c.; Skiddaw; Cheviots; Scotland, Highlands, Tweed, Forth, Moray, Tay; Ireland, Croagh Patrick, Mangerton, &c.

L. fulvibarbis, Dej. Dark blue, sometimes almost black; thorax short, very strongly rounded at sides and contracted towards base with side margins narrow and but slightly raised; elytra rather wide with very deep and strongly punctured striae; legs red, base of femora often darker. L. $6\frac{1}{2}$ – $7\frac{1}{2}$ mm.

Very common in England; Scotland, local, Lowlands; Ireland, near Dublin and Belfast.

L. ferrugineus, L. (*spinilabris*, Panz.). Upper side entirely lighter or darker red-brown; thorax short, very strongly rounded at sides and contracted to base, with posterior angles sharp right angles; elytra long oval with deep and strongly punctured striae, which become shallower at sides, but are always traceable; legs testaceous. L. 6 mm.

Rather common in England; Scotland, only recorded as Scotch by A. Murray, "not uncommon at Pressmenan, Lammermuir Hills;" Ireland, apparently very local.

L. rufescens, F. (*terminatus*, Panz.). Rather darker than the preceding; sometimes with thorax and elytra entirely dark piceous; easily distinguished from *L. ferrugineus* by its black head and the blunter angles of the thorax; the elytra are rather wider than in that species, and the striae are feebler and almost obsolete at the sides; legs testaceous. L. 6 mm.

This species seems more attached to damp places at the roots of grass than the preceding, and is very often taken by sweeping; it is local but not uncommon throughout the country; Scotland, scarce, Lowlands; Ireland, very local, Armagh, Antrim.

NEBRIA, Latreille.

This genus comprises the old genus *Helobia*, Curtis, and at one time included *Pelophila*, Dej., as well; the species are very numerous, and are widely distributed throughout Europe, Asia, and North America. The species of *Nebria* proper are for the most part inhabitants of the sea coast, while the species of *Helobia* (represented in our fauna by *N. brevicollis* and *N. Gyllenhalii*) are inland insects: this does not, however, always hold good. They vary considerably in structure, but for the most part are remarkable for their short thorax, which has the sides strongly contracted towards base as in *Leistus*.

As a rule the species belonging to the sub-genus *Helobia* are dark-coloured; some, however, e.g. *N. catenulata* and *N. metallica*, are very brightly tinted with iridescent metallic colours.

The larva of *N. brevicollis* is figured by Schiödt (Part iii., Pl. xiv. 1), and it is also described by Blisson (Ann. Fr. 1848, 73). It is dark brown or luteous above and straw-coloured below; the head is somewhat orbicular, not as broad as prothorax, to which it is joined by a rather long and distinct neck; the prothorax is transverse, and bears a large finely margined shield which nearly covers its whole surface; the dorsal abdominal shields are not margined; the ninth abdominal segment is very short, almost hidden, and the anal appendage is long and cylindrical; the cerci are

long, with long outstanding hairs, and furnished with minute setigerous tubercles; tarsal claws very unequal; the larva is very active, and is found in damp and shady places.

I. Thorax entirely or partially reddish or testaceous.

- i. Head testaceous; elytra testaceous with wavy dark markings *N. COMPLANATA*, *L.*
- ii. Head black; elytra black with testaceous margins *N. LIVIDA*, *F.*

II. Thorax black.

- i. Antennæ and palpi red *N. BREVICOLLIS*, *F.*
- ii. Antennæ and palpi blackish *N. GYLLENHALII*, *Schaum.*

***N. complanata*, L.** Broad, and entirely pale ochreous yellow, with inside of mandibles and two very irregular bands on elytra black; thorax narrow, moderately contracted at base with acute posterior angles, with a transverse impression in front and behind, united by a faint dorsal line; elytra oblong, rather flat, testaceous with deep striae not very evidently punctured; legs testaceous, femora sometimes slightly darker. L. 18-20 mm.

On sandy coasts under refuse, &c. Devonshire, Barnstaple. Bideford, Woolcombe sands near Ilfracombe; Wales, Swansea (rather common), Tenby (very rare); also recorded from Lincolnshire coast, but I have never heard of one being captured in this county; Ireland, one dead specimen found on the Arklew sands by Mr. Furlong and recorded by Mr. Haliday. Also lately taken by Mr. W. de Visines Kane at Courtown, co. Wexford. The Welsh specimens are of a lighter colour than the Devonshire ones.

***N. livida*, F.** Smaller, narrower and more elongate than the preceding; head black, mouth-parts and antennæ testaceous. Thorax testaceous, with the anterior and posterior margins black, very transverse, rather strongly contracted at base, anterior angles produced, posterior angles obtuse but well marked, lateral margins broadly reflexed and punctured; elytra oblong, depressed, black with testaceous margins, with sides almost parallel, and deep, punctate striae; legs and extreme apex of abdomen testaceous. L. 14-16 mm.

Very local. Cromer; Scarborough, Bridlington, and Filey; it occurs in abundance in the crevices of the clay cliffs on the Yorkshire coast at the two first of these three localities. I have never found more than one or two under refuse on the shore, and these were evidently stray specimens. It has also been taken at Cannock Chase, Staffordshire, by Mr. Garneys and Mr. J. Harris; this is a very remarkable locality for this usually maritime insect.

***N. brevicollis*, F. (*cursor*, Müll.).** Rather flat, black, antennæ red; thorax short, strongly contracted behind, with broad and coarsely punctured margins; elytra rather broad and parallel-sided with deep and strongly punctured striae; legs red, femora sometimes pitchy black. L. 9-12 mm.

Very abundant and widely distributed; one of our commonest British insects.

***N. Gyllenhalii*, Sch. (*hyperborea*, Gyll.).** Smaller and narrower than the preceding with the antennæ dark; the underside of the breast is finely punctured, whereas in *N. brevicollis* this part is coarsely punctured; the legs as a rule are black, but occasionally they are entirely red; elytra oblong with shoulders narrower and more rounded

than in the preceding species: occasionally varieties occur with the elytra entirely rust red. L. $8\frac{1}{2}$ – $9\frac{1}{2}$ mm.

A very common mountain species, frequenting the banks of streams and rivulets and damp places among stones. Derbyshire; Lake District; Wales; Scotland, Highlands; Ireland (mountainous districts); the variety with red legs is said to be common on Snowdon.

PELOPHILA, Dejean.

This genus comprises very few species, which are mostly confined to Northern Asia; it forms the transition from the *Nebriina* to the *Elaphrina*, the structure of the mouth closely resembling that of *Nebria*, while its general form connects it closely with *Blethisa*.

P. borealis, Payk. Brassy black or brassy; palpi and antennæ black; thorax short, sides strongly rounded and contracted to base, posterior angles acute, anterior and posterior margins strongly punctured, central furrow distinct; elytra much broader than thorax, with sides slightly rounded, striae shallow, often almost obsolete at sides, the third interstice with four or five very large round impressions, and the fifth with two to five, the number varying in different specimens or even on different elytra of the same insect. Legs black, sometimes more or less ferruginous. L. 8–11 mm.

Under stones or running in the sun by the side of lakes, &c.; not recorded from England or Wales. Scotland, Orkney Islands. Ireland, rather widely distributed, and common where it occurs; Killarney; near Belfast; Lough Neagh. I have just (Oct. 1885) received a large series from Lowry's Lough, near Armagh, from Rev. W. F. Johnson; the Irish examples are more brassy than the Scotch.

ELAPHRINA.

- | | |
|---|----------------|
| I. Side margins of elytra continued as far as scutellum; thorax with lateral margins wide | BLETHISA, Bon. |
| II. Side margins of elytra not continued at base; thorax with very narrow lateral margins | ELAPHRUS, F. |

BLETHISA, Bonelli.

The genus *Blethisa* comprises about a dozen species confined to the northern hemisphere.

B. multipunctata, L. Brownish or greenish brassy; thorax broader than the head, a little broader than long, subquadrate, very slightly narrowed towards base, posterior angles acute, base broad and with a deep punctured fovea on each side, side margins very wide; elytra broad, rather parallel-sided, with greenish margins, striae rather irregular, finely punctured, interstices convex, the third and fifth interrupted with from three to five large shining impressions; legs brassy black. L. 11 mm.

Local and rather rare, but widely distributed; in marshy places or on the banks of streams and rivers under stones, &c., or running in the sun. Cambridgeshire Fens;

Askham Bog, York; Repton; Lincoln; Carlisle; rare in the London district; Essex; Slapton Ley, Devonshire. Scotland local, Lowlands; also taken at Braemar. Ireland, near Belfast.

ELAPHRUS, Fabricius.

The species of this genus (about thirty in number) are confined to the northern hemisphere. In the shape of their head, large prominent eyes, general contour, and the rapidity of their movements they bear a close resemblance to the Cicindelidae; they are found in damp places, on the mud at the margins of streams and rivers, running with great swiftness in the sunshine.

The larva of *Elaphrus cupreus* is figured by Schödlte (iii, Pl. xiii., Fig. 2). It is linear, slightly fusiform, with a subquadrate head fastened to the thorax by a very broad neck; the clypeus is serrate and has the centre sharply elevated into a short, sharp, conical horn; the shields of the thorax and of all the dorsal segments of abdomen are margined, shortly pilose, and furnished with erect setae; the cylindrical anal appendage is twice as long as the ninth segment, and the cerci are comparatively short and thick, a little bent, and somewhat branched, furnished with long outstanding hairs; the larva is white with the head and dorsal shields of thorax and abdomen metallic; the legs are yellowish, with strong claws of equal length.

I. Tibiæ testaceous.

- i. Male with three first joints of anterior tarsi dilated; elytra with one polished raised granule near suture especially conspicuous *E. RIPARIUS*, L.
- ii. Male with four first joints of anterior tarsi dilated; elytra with four polished raised granules near suture about equally conspicuous *E. CUPREUS*, Duft.

II. Tibiæ dark.

- i. Sculpture of elytra distinct. L. 7 mm. *E. ULIGINOSUS*, F.
- ii. Sculpture of elytra indistinct. L. 9 mm. *E. LAPPONICUS*, Gyll.

***E. riparius*, L.** Upper side coppery with a strong metallic green tinge; antennæ greenish at base, the upper joints fuscous and pubescent; thorax narrowed in front and behind, densely punctured, with a dorsal line dividing and usually forming a Y in front; elytra broad, very densely punctured with four rows of shallow ocellate foveæ; near the suture is a conspicuous polished granule, and traces of smaller ones towards apex; tarsi and femora metallic green, tibiæ testaceous. L. 6-7 mm.

Common and widely distributed throughout England; abundant in the Lowlands of Scotland, but not recorded from the Highlands. Ireland, near Dublin and Belfast.

***E. cupreus*, Duft.** Brownish brassy with a purplish tinge on the elytra; antennæ black, basal joints with a metallic tinge; thorax rather long, somewhat coarsely punctured, with strong Y-shaped furrow on centre of disc, posterior angles very acute and prominent; elytra broad, with four rows of shallow, coarsely punctured, ocellate foveæ, usually of a purple colour, with a longitudinal raised granule between each pair,

those at the side being indistinct; femora and tarsi metallic, tibiæ testaceous. L. 8 mm.

Common and widely distributed throughout the kingdom.

E. uliginosus, Fabr. Very like the preceding, but easily distinguished by its black tibiæ and greenish colour; the thorax is shorter and narrower in front, with the sides much more strongly dilated and rounded in the middle, and the punctuation much more distinct; the elytra have the large ocellate foveæ, as a rule, shallower and smaller. L. $7\frac{1}{2}$ –8 mm.

Local and rather rare; Cambridgeshire Fens; Swansea; Devonshire; Weston, Oxfordshire; Repton; near Croydon; Coombe Wood. Scotland, scarce; Tay, Dee, Solway; has occurred in some numbers at Rannoch.

E. lapponicus, Gyll. Very variable in colour, brassy green, coppery red, bluish, crimson, or darkly coloured; head longitudinally rugose behind, antennæ black with the base metallic; thorax rather long with the sides not strongly rounded and only moderately contracted behind, posterior angles only slightly prominent, dorsal furrow rather obsolete in some specimens, strongly marked in others; elytra oblong ovate, longer than in any of the preceding species, sculpture and markings on the same plan, but much less pronounced, and often very indistinct; legs entirely dark, more or less metallic. L. 9 mm.

Rare; a mountain species; found chiefly in the Scotch Highlands, Tay, Dee, Hebrides; taken on the Catlaw and Clova Mountains in Forfarshire, at Braemar, &c.; has also occurred on Skiddaw (J. T. Harris).

The genus *Omophron*, once reputed as British, appears to bear a close relationship in many points to the *Elaphrina*, notably in the structure of its mouth organs, and in the similarity of some of its habits. In general form it much resembles a *Haliplus*, and this, coupled with its habitat in wet sand near the margins of streams or ponds, has led many people to consider it as a connecting link between the Carabidæ and Dytiscidæ: on a close examination of its structure, however, its proper position appears to be near *Elaphrus*. Erichson, followed by Gemminger and v. Harold (Munich Catalogue, i. p. 42), Horn, and others, places it at the head of the Carabide series. Gyllenhal placed it near *Loricera*. The larva is very peculiar, resembling a young *Gryllotalpa*, and being remarkable for its very large convex prothorax, and long stout legs.

LORICERINA.

The Loricerina are closely connected with the Nebriina and Elaphrina, and on the other side show in many points an affinity to the Panagæina.

LORICERA, Latreille.

This genus comprises a small number of species, which, with one or two exceptions, are confined to the northern hemisphere. Our single

species, which is also the only one found in Europe, is remarkable for the long hairs borne by the second to the sixth joints of the antennæ.

The larva of *Loricera pilicornis* (figured by Schiödte, iii., Pl. xiv., Fig. 8) is one of the most remarkable of the Carabideous larvæ; the head is round, rather broader than long, with large mandibles and very peculiar maxillary palpi, the stipites being, as Schiödte observes, “stupendæ magnitudinis;” this term also applies to the cerci, which are as long as all the abdominal segments together; the muscular impressions of the meso- and meta-thorax are very conspicuous: the membranous portions of the body are white, while the corneous portions (which are much softer than is usual), together with the cerci, are black; the larva is very active; the pupa, also figured by Schiödte, is as abnormal as the larva.

L. pilicornis, F. Brassy or brassy black, sometimes with a greenish reflection; head short and wide, eyes globose and prominent, antennæ fuscous black, first joint smooth, reddish at base, joints 2-6 set with long rigid hairs; thorax rounded in front, contracted behind middle, posterior angles obtuse, with a well-marked central furrow, and rather strong lateral margins; elytra rather broad with twelve striae composed of fine regular punctures, with three large impressed foveæ on the third and fourth striae; femora dark, tibiæ and tarsi testaceous.

Very common and widely distributed throughout the kingdom, except in the extreme north of Scotland: it is found on the borders of rivers and streams, at the roots of trees, and in various other situations.

SCARITINA.

The *Scaritina* comprise a considerable number of genera and a great many species: they are distinguished by having the elytra separated from the thorax by a more or less distinct peduncle, by their short antennæ, which are often elbowed, and by the broad, strong, palmate or dentate anterior tibiæ, with which they dig and burrow in the sand or sandy earth in which they live; their colour for the most part is black or bronze. Some of the species are very large, but these, as a rule, are inhabitants of the New World; our species are small, and we do not possess a single *Scarites* proper.

- I. Thorax more or less quadrate; side border of thorax prolonged to meet basal margin CLIVINA, Latr.
- II. Thorax globose; side border of thorax evanescent towards base DYSCHIRIUS, Bon.

CLIVINA, Latreille.

This genus contains over 200 species, which are widely distributed over the surface of the globe; they are almost all blackish or reddish-brown; they are found in damp places, on the banks of streams, &c., under stones or refuse, in galleries or burrows which they dig in the sandy ground or mud.

- I. Thorax and elytra unicolorous pitchy black; elytra elongate but not parallel-sided C. FOSSOR, L.
- II. Thorax pitchy black; elytra ferruginous; elytra parallel-sided C. COLLARIS, Herbst.

C. fossor, L. Pitchy black, with the margins of the elytra and the suture sometimes pitchy red; thorax nearly quadrate, broadest behind at the posterior angles, disc more or less transversely strigose; elytra elongate, dilated behind middle, with strong punctured striae, the third with four larger impressions; legs ferruginous. L. 6 mm.

Common in England and Ireland. Scotland, abundant, Lowlands.

C. collaris, Herbst. Smaller narrower and more elongate in proportion than the preceding; head and thorax pitchy, elytra ferruginous; head shorter and rounder; thorax more quadrate, less dilated at the posterior angles, and with disc smoother; elytra narrower. The distinctive characters that separate this insect, although slight, are very constant. L. $5\frac{1}{2}$ mm.

Local but not uncommon in England, and Scotland, Lowlands.

DYSCHIRIUS, Bonelli.

The species of this genus, about 125 in number, inhabit for the most part temperate regions; very few are found within the tropics; they are usually of a bronze colour, brilliantly shining, although specimens are often taken of a black or dark-brown colour without any metallic tint. Our species are among the smallest of our Carabidæ; they burrow in sandy places on the sea coast or on the banks of ponds or streams; they are nearly always found in company with different species of *Bledius*, which in all stages seem to be their natural prey.

The larva of *Dyschirius thoracicus* is described by Thomson (Skand. Col. i., p. 187), and is figured by Schiödte (iii., Pl. xviii., Fig. 17). It is about 6 mm. long, ferruginous, with the head and upper side of thorax darker; the head is quadrate with serrated clypeus and strong mandibles; the prothorax is quadrate, of the same breadth as the head; the whole larva is parallel-sided, the abdominal segments from the seventh becoming narrower; the conical anal appendage is about as long as the ninth segment, and the cerci are very short, not as long as the anal appendage; the muscular impressions of the first seven abdominal segments are very strong; the upper surface of the body is depressed, smooth and shining, and covered with small erect setæ. The larvæ, like the perfect insects, are found on the sandy shores of the sea, lakes, or rivers, devouring the larvæ of *Bledii* and *Heteroceræ*.

The species are very hard to distinguish in many cases; the chief points to be noticed are the shape of the elytra, whether ovate or cylindrical, the punctuation or absence of punctuation of the striae, and the dentation of the exterior side of the front tibiae.

I. Striae of elytra prolonged to apex.

- i. Anterior margin of clypeus with a central tooth (distinct in male, sometimes feeble in female).

1. Interspaces of thorax and elytra smooth; striae of elytra finely and plainly punctured . . . D. THORACICUS, Rossi.

2. Interspaces of thorax alutaceous; striae of elytra strong, almost impunctate . . . D. OBSCURUS, Gyll.

- ii. Anterior margin of thorax without central tooth.

1. Teeth on outer side of anterior tibiae indistinct.

- A. Interstices of elytra convex; striae deep, almost impunctate . . . D. IMPUNCTIPENNIS, Daws.

- B. Interstices of elytra flat; striae plainly punctured.
- a. Lateral border of elytra ceasing at shoulder or very indistinctly prolonged.
 - a* Elytra narrow, cylindrical, with striae finer and punctures wider apart *D. POLITUS, Dej.*
 - b* Elytra oblong, with striae coarser and punctures nearer together *D. NITIDUS, Dej.*
 - b. Lateral border of elytra clearly prolonged from shoulder in a fine raised line to peduncle; elytra cylindrical *D. EXTENSUS, Putz.*
2. At least the lower tooth on the outer side of the anterior tibiae distinct.
- A. Lateral margin of elytra prolonged from shoulder. *D. ANGUSTATUS, Ahr.*
 - B. Lateral margin of elytra not or very feebly prolonged from shoulder.
 - a. Thorax somewhat parallel-sided; elytra cylindrical *D. SALINUS, Schaum.*
 - b. Thorax almost circular; elytra oblong ovate *D. AENEUS, Dej.*
- II. Dorsal striae on elytra effaced on sides and towards apex; sutural stria shortened at base, entire at apex; species very small. *D. GLOBOSUS, Herbst.*

D. thoracicus, Rossi. Shining bronze, sometimes shining black or lull black, occasionally reddish; head small, deeply furrowed on each side between the eyes; mouth parts (except tips of mandibles), basal joint of antennae and base of two next joints red; clypeus with three teeth, the central one more or less distinct; thorax very globose with a strong dorsal furrow deepest at base; elytra ovate, slightly narrowed in front with rounded shoulders, with rather fine and distinctly punctured striae, the third interstice with two or three impressions, marginal stria reaching beyond humeral angle; anterior tibiae acutely dentate externally, with the apical tooth largest; legs more or less ferruginous, femora (especially the anterior pair) darker, or quite black. L. $3\frac{1}{2}$ mm.

Sandy places on the coast; under stones or in damp places; Bridlington in profusion in company with *Bledius arcnarius*; Chesil Beach; Kent (not common); Newcastle-on-Tyne; and many other places. Scotland only recorded from one locality, Aberlady, where it is common. Ireland, near Dublin.

D. obscurus, Gyll. This species appears to come very close to the preceding, of which it has been considered a variety. Gyllenhal, in his description (Insect. Suec. iv. 156), describes it as exceedingly like *D. thoracicus*, but shorter, smaller, with the antennae and legs more rufous and with the striae of the elytra scarcely punctured. Dawson (Geod. Brit. p. 29) compares it with *D. salinus*, and says that it is shorter and narrower than that insect, and may be recognized by its elongate and cylindric form, and more especially by the deeply impressed striae on the elytra, which are entirely smooth and impunctate; the colour appears to be obscure brassy or greenish black. Length about 3 mm.

Introduced as British on the authority of M. Putzeys, who said that M. Reiche possessed a specimen taken in England; afterwards recorded by Haliday from Lough

Neagh, Ireland. I can, however, find no trace of an authentic British specimen, and for the present at all events it ought not to be admitted to a place in our lists.

D. impunctipennis, Daws. (*inermis*, Curt.). Head and thorax as a rule obscure black or pitchy, elytra pitchy, often æneous, or the whole insect is of a dark bronze colour, head with an oblong depression behind the eyes, palpi and antennæ ferruginous, paler at base; thorax rather long, somewhat narrowed in front, sides not strongly rounded, disc with central furrow; elytra less ovate and more parallel-sided than in *D. thoracicus*, deeply striated, the striæ deepest at the base next the suture, apparently quite impunctate, except under a strong lens which renders visible some fine punctures irregularly scattered, third interstice with two, occasionally with three impressions; anterior tibiæ furnished externally with two very obsolete almost invisible teeth very different from the sharp and distinct external teeth of *D. thoracicus*.

Sandy places on or near the coast. Weymouth; Deal; Lancashire coast; sands bordering the Bristol Channel. Scotland, very local, Moray, Solway.

D. politus, Dej. Æneous or greenish bronze, female duller, often black or pitchy; mouth parts and antennæ ferruginous, base of latter lighter; thorax oblong ovate, longer than broad, with sides rather parallel, not strongly rounded, central furrow rather fine; elytra hardly broader than thorax, broad and rather elevated at the shoulders, elongate, sides not quite parallel but gradually decreasing in width toward apex, with plain punctured striæ, which are continued to the apex, or unite and terminate in pairs just before it, third interstice with two or three impressions; the anterior tibiæ are furnished externally with two obsolete denticulations, which are often quite wanting. L. 4 mm.

Sandy and clayey places, on the banks of ditches, &c.; occasionally found in sand-pits; inland, and maritime. Sheppy in company with *Bledius spectabilis* and *tricornis*; Sheerness; Deal; Shirley; Red Hill; Charlton; Brentford; West Wickham. Scotland, very local, at the mouth of the Nith below Dumfries, scarce. Ireland, near Belfast. Dawson mentions Lowestoft and other places on the Suffolk, Norfolk, and Lincolnshire coasts, and also Bridlington, Yorkshire; at the latter place I have taken very sparingly a small *Dyschirius* which I used to consider *D. angustatus*, but which appears rather to be a small form of *D. politus*; the external teeth of the anterior tibiæ are occasionally rather plain in these specimens, but are often quite absent; they occur in company with a *Bledius* which appears to be *crassicollis*, but in some points differs from that insect, although it is plainly not *erraticus*, the only other species belonging to this section.

D. nitidus, Dej. Shining brassy; base of antennæ and mouth parts ferruginous; head with a deep rugose impression on each side between eyes, united in front by a transverse elevated line; thorax rather longer than broad, broadest behind the middle, disc very convex with a deep central furrow; elytra wider than the thorax, elongate, with shoulders well marked, sides subparallel, strongly striated, especially at the base and near suture, the striæ plainly punctured except at apex, marginal stria abbreviated at shoulder, third interstice with two or three

impressions; legs stouter than in the other species; external teeth of anterior tibiæ small or entirely wanting. L. $4\frac{1}{2}$ – $5\frac{1}{4}$ mm.

Very local; maritime; Norfolk and Lincolnshire coasts; Wallasey, near Liverpool; Deal; Shoreham; Thames and Humber (Stephens). Scotland, very local, Moray and Solway. It is the largest of our indigenous Dyschirii.

D. extensus, Putz. (*elongatus*, Daws.). Shining bronze, mouth parts, antennæ, and legs red; thorax half as long again as broad, as broad as elytra, with a fine but distinct central furrow; elytra very elongate, cylindrical, parallel-sided, with strong punctured striæ; the anterior tibiæ present hardly any trace of teeth, or are quite simple. This species is easily distinguished from all the others by its narrow and quite cylindrical form, elongate elytra, and very long thorax. L. $3\frac{1}{2}$ mm.

Very local and rare; maritime; Deal; Shoreham; Lancing; near Folkestone; found by Mr. A. C. Horner in company with *Bledius tricornis*, not molesting the *Bledius*, but devouring ants which abounded in the vicinity.

D. angustatus, Putz. (*jejunus*, Daws.). Head and thorax brassy black, elytra brassy; head rugose; antennæ red, lighter at base; thorax rather long, hardly narrower in front than behind, where it is widest, with sides slightly rounded, central furrow distinct, but rather fine, disc moderately strongly striated; elytra elongate, with well-marked shoulders, with sides somewhat parallel, striæ distinct and plainly punctured, feebler towards apex; legs red; anterior tibiæ armed externally with two distinct strong obtuse teeth, the lower one largest. L. $2\frac{1}{2}$ –3 mm.

Very local and rare; banks of the Irthing, Northumberland (Bold); Hayling Island (E. Saunders). Easily distinguished by its narrow cylindrical form, rugose head, and the external denticulation of the anterior tibiæ.

D. salinus, Schaum. Dark bronze, sometimes bluish or greenish; palpi, and antennæ except base pitchy; thorax short hardly longer than broad, broadest behind the middle, somewhat globose, with distinct central furrow; elytra broader than the thorax, somewhat cylindrical, rather flat, with strong striæ which are coarsely and deeply punctured towards base, but more feebly towards apex and at sides; legs pitchy or pitchy red; anterior tibiæ armed with two teeth, the one nearest the apex being very large and distinct. L. $3\frac{1}{2}$ mm.

Maritime; salt marshes and banks of ditches near the sea; also banks of tidal rivers; widely distributed and very abundant where it occurs. Scotland local, maritime, Forth, Solway. Ireland, near Dublin. This species is easily distinguished from *D. politus*, which is its nearest ally, by its shorter thorax, more parallel elytra, very distinct punctuation, and the larger teeth on the external side of the anterior tibiæ.

D. æneus, Dej. Much smaller than the preceding, which in some points it resembles; the thorax, however, is more rounded than in *D. salinus*, and the elytra are oblong ovate, and rather strongly rounded at the sides; the striæ are strong and coarsely punctured towards base, finer and more feebly punctured behind middle, and the marginal stria ceases

at the humeral angle ; legs dark red, pitchy, or black ; anterior tibiæ furnished with two external teeth, the one near apex strong, the other almost obsolete. L. $2\frac{1}{2}$ mm.

Sandy banks of ponds and ditches, maritime and inland. Burton-on-Trent ; Bewdley ; Canoeck Chase ; Plumstead Marshes ; Sheppy ; Gravesend ; Darent Wood ; Weybridge ; Reigate ; Whittlesea Mere ; Hastings ; Glanvilles Wootton ; Luccombe Chine, Isle of Wight ; Northumberland. Scotland, Tain, Rosshire (Bold). Ireland (rare).

This is a variable species both as regards form and colour : the Isle of Wight examples are more slender than the type in many cases ; a specimen I took at Luccombe in April, 1885, not only is narrower, but has the sides of the thorax less rounded.

D. globosus, Herbst. Black or pitchy, sometimes bronze ; antennæ pitchy, base reddish ; thorax very convex, globose, with fine central furrow ; elytra ovate, with shoulders rounded, very convex, with strong and very coarsely punctured striæ which disappear before apex and at sides, with the exception of the sutural and marginal striæ ; legs red or pitchy, femora often darker ; anterior tibiæ with two minute external teeth. L. 2 mm.

Sandy banks of ponds, &c., inland and maritime ; widely distributed in England, and occurring in great profusion. Scotland, common, Lowlands. Ireland near Belfast and Dublin, and probably common throughout the country.

HARPALINÆ.

The tribes that make up the Harpaline series (*Harpalinæ tribus*) include the whole of the remainder of the Carabidæ ; they are distinguished by the fact that the mesothoracic epimera do not reach the middle coxal cavities, which are entirely closed by the sterna. Various methods of classification have been adopted for the series ; none, however, can be quite satisfactory, for a linear classification is impossible, many of the tribes and genera running parallel to one another and presenting equal affinities in different directions ; the system below adopted, however, appears to be for many reasons open to fewer objections than some of the others ; it is based upon the old distinction of the formation of the anterior tarsi of the male ; this is indeed open to some objections, notably that it excludes the determination of the position of the female apart from the male, but it is more satisfactory and holds together genera with evidently natural affinities better than less evident and more artificial characters that have been adopted by some writers, which are very useful in subdivision, but if used as primary characters, separate genera widely that ought evidently to be placed close together. One of the chief alterations that have been made of late years is the removal of the Bembidiina from the end of the family of Carabidæ ; owing to the small subulate last joint of the palpi occurring in the Halipidæ and some of the Dytiscidæ, as well as in the Bembidiina, coupled with the subaquatic habits of the latter, they were considered as a connecting link between the Geodephaga and Hydradephaga ; it is, however, generally acknowledged that for several reasons the Bembidiina are more fitly placed higher in the series, although, if we recognize the

system of parallel tribes, we need not lose sight of their affinities to the true water beetles.

The following are the chief divisions of the Harpalinæ :—

- I. Elytra not truncate at apex INTRUNCATIPENNES.
- II. Elytra truncate at apex, or subtruncate TRUNCATIPENNES.

INTRUNCATIPENNES.

The group in which the elytra are not truncate at apex comprises five great subdivisions ; for help with regard to them, more especially with regard to the covering of the soles of the anterior tarsi of the male, I am much indebted to the kindness of Mr. Bates.

- i. **DIVERSIMANI.** Male with the anterior tarsi differing in the various species as regards the number of joints dilated, the soles of the dilated joints clothed with fine short erect hairs.
- ii. **PATELLIMANI.** Male with the first two or three joints of the anterior tarsi dilated either *square, transverse-oblong, or rounded*, the soles clothed with fine short erect hairs: the first joint is sometimes rounded triangular.
- iii. **QUADRIPALMATI.** Male with the first four joints (occasionally joints 2-4) of the anterior tarsi dilated, the soles of the dilated joints clothed with biseriata squamæ or with fine short erect hairs; intermediate tarsi often dilated as well.
- iv. **TRIPALMATI.** Male with the first three joints of the anterior tarsi dilated, *cordiform or emarginate*, the soles clothed with squamæ.
- v. **BIPALMATI.** Males with the first two joints of the anterior tarsi dilated (occasionally in certain *Tachys* quite simple), the soles almost always clothed with squamæ, in one or two cases, e.g. *Tachypus*, pilose.

Sub-Div. i. **Diversimani.**

This division is established by Bates (*Biologia Centrali-Americana*, Carabida, p. 39), where he says, "This new subdivision is here proposed for the reception of the *Broschina* group of authors, which differs from all other aggregates of genera by the great diversity in the form and number of the dilated joints of the male tarsi, the pulms of the same being invariably clothed with a smooth brush of hairs. Not only are the tarsi of the middle as well as of the front pair of legs sometimes dilated (gen. *Cascelius*, *Cerodalis*, and others), but the number of dilated joints varies from species to species, and in some members of the typical genus (*Brosca*) is reduced to two on the anterior tarsi only; and again species occur in which the male tarsi are simple like the female. This peculiarity sufficiently distinguishes the subdivision from the equivalent groups of the same rank (*Patellimani*, &c.), and the position of the subdivision at the commencement of the second great section of the Carabida, which I now adopt, is sufficiently indicated by the occurrence in one or other of the genera of minor characters distinctive of the first great section—for instance, the glabrous surface of the four basal joints of the antennæ, a character which does not reappear henceforward in the long series of forms belonging to the second division of this great family."

BROSCINA.

The division *Diversimani* is hardly required for our fauna, as we only

possess two genera comprising one species each, *Broschus* and *Miscodera*, both of which have the first three joints of the anterior tarsi of the male dilated, the former rather strongly, the latter only moderately; no confusion, however, can arise, as our species are easily distinguished by having the hind body pedunculate, and by having the scutellum situated in the peduncle, and not let into the base of the elytra; as the neck of the thorax covers the peduncle either wholly or partially, the thorax requires to be bent forward in order to render the character quite distinct; the first four joints of the antennæ are glabrous, the rest pubescent.

- I. Head narrower than thorax; penultimate joint of maxillary palpi strongly narrowed behind, somewhat dilated in front; base of thorax not fringed **MISCODERA, Esch.**
 II. Head as broad as thorax; penultimate joint of maxillary palpi normal; base of thorax fringed with a row of close-set fine bristles **BROSCUS, Panz.**

MISCODERA, Eschscholtz.

This genus comprises five species from Northern Europe and North America. Dr. Horn includes three of the species under *M. arctica*, and considers that there are only two species, *M. arctica* and *M. insignis*; he says (*Carabidæ*, p. 168), that in Northern Europe and Siberia *M. arctica* has received the name of *erythropus* Mots.; crossing to Alaska it becomes *Americana* Mann., and finally reaches Newfoundland under the name *Harlyi* Chaud.; it is, however, all one species varying in size and brilliancy of surface in the several localities. The species in form and general appearance resemble a large *Dyschirius*, and seem therefore naturally to follow this genus: it must be remembered, however, that they differ very widely in many respects, and that it is not because of the similarity of outward form that they are placed after them.

M. arctica, Payk. (*Leiochiton Readii*, Curtis). Usually brassy, sometimes greenish black or black; antennæ and palpi red; thorax globose, very convex, with a rather indistinct dorsal line, base without foveæ at sides, with a narrow depressed neck; elytra ovate with shoulders rounded, with a few more or less obsolete punctured striae near suture which vanish at sides and apex; hind body pedunculate, scutellum situated in peduncle; legs red. L. 6 mm.

Local, usually on high moors and mountains, under stones, &c.; Derbyshire; Yorkshire; Llangollen, Moel-y-Gamblin; Church Stretton; Cannock Chase (taken in numbers by Mr. Blatch). Scotland, local, mountains and high moors, Tweed, Tay, Dee, Clyde.

This species bears a remarkable resemblance to the continental species *Brososoma baldense*, Putz.

BROSCUS, Panzer.

This genus comprises about a dozen species which are rather widely

distributed; they are as a rule of a deep black colour; the American genus *Zarotus*, which is closely allied to *Brosesus*, is brilliantly copper-coloured. We possess one species only, which, like other members of the genus, is found under stones in burrows which it hollows out in the ground: when disturbed suddenly it feigns death, opening its jaws and stiffening its legs in irregular directions.

There is nothing remarkable about the larva of *B. cephalotes*, which is figured by Sebiötte (iii., Pl. xix., Fig. 1). It is linear, depressed, and parallel-sided, gradually narrowed from the seventh abdominal segment; the head is large, with powerful jaws, of equal breadth with the segments of the thorax; the anal appendage and cerci are short, the latter twice as long as the former; the claws are solid, not divided; the colour is white, with the head, mandibles, and disc of prothorax ferruginous, and the dorsal shields, legs, and cerci yellowish.

B. cephalotes, L. Elongate, dull black; antennæ black, upper joints reddish, apex of palpi red; head coarsely punctured, with two deep impressions between antennæ; thorax cordate, not contracted in front, strongly contracted behind, with indistinct central furrow, disc transversely rugose, base strongly punctured; elytra flat, dull, sides rather parallel, with eight very shallow finely-punctured striae; legs black, anterior tibiae armed internally with two strong spines for digging purposes. L. 17–21 mm.

Common on the coast in England, Scotland, and Ireland; it is, however, by no means a coast species exclusively. Bedel gives as localities (l. c. p. 186) "Toute l'Europe moyenne; Hautes Alpes."

Sub-Div. ii. **Patellimani.**

- | | |
|---|------------|
| I. Maxillary palpi elongate, the last joint triangularly dilated, and inserted obliquely on the preceding; head constricted behind eyes, and dilated into a semi-globular neck. | PANAGÆINA. |
| II. Maxillary palpi with the last joint simply inserted on the preceding; head not dilated behind into a semi-globular neck. | |
| i. Mandibles obtuse, emarginate at apex; clypeus partially membranous | LICININA. |
| ii. Mandibles simple at apex; clypeus entirely corneous. | |
| 1. Eighth stria of elytra distant from margin; eyes regular in outline | CHLENTINA. |
| 2. Eighth stria of elytra very close to margin; eyes truncate behind | OODINA. |

PANAGÆINA.

The position of this tribe has been much disputed. Dr. Horn considers that it stands more nearly alone than any tribe of the Harpalinae, and that it bears a close relationship to the Clivinae, and none to the Chleniina at all. Lacordaire included *Loricera*, and Bedel (l. c. p. 50) places the tribe at the head of his family Harpalidae between the *Loriceridae* and the *Licinina*; Thomson places it between the *Licinina* and *Chleniina*, and Erichson (*Natargesichte der Ins. Deutschl.*, p. 316) between the *Loriceridae* and *Chleniidae*. In several points, especially in the con-

struction of the anterior tarsi of the male (which have two joints strongly dilated), the genus *Panagæus* bears a close relation to *Licinus*.

PANAGÆUS, Latreille.

About twelve species are comprised in this genus, of which two only are European; the rest are found in Japan, Mexico, North America, &c. They are diurnal; our two species are found, the one in marshy and damp places, and the other in drier localities; they are distinguished by the black suture of the elytra forming with a horizontal band a distinct cross on an orange ground, by their orbicular thorax, and by the securiform last joint of the maxillary and labial palpi.

The larva of *P. crux-major* is figured by Schiödte (vi., Pl. iii., Fig. 6). It is fusiform, convex above and below, pilose, with the head and all the scuta smooth and shining; the colour is clear white, with the head luteous, and the scuta black or fuscous; the head is small, hexagonal, the prothorax trapezoidal, much narrower than the mesothorax, the sides of which are strongly angled; the metathorax is hexagonal, strongly transverse; the abdominal segments are plainly narrower than the thoracic segments; the anal appendage is rather stout, and the cerci are long and cylindrical, black, with the apex clear white; the claws are of equal length; the antennæ are long, much longer than is usual in the Carabideous larvæ.

- I. Thorax more transverse; eyes more prominent;
 species larger *P. CRUX-MAJOR*, L.
 II. Thorax longer, almost circular; eyes less prominent;
 species smaller *P. QUADRIPUSTULATUS*, St.

***P. crux-major*, L.** Upper side clothed with long yellowish pubescence; head and thorax black, the former strongly produced before eyes, the latter broader than long with sides strongly rounded, very coarsely and rugosely punctured; elytra red with apex, base, suture, and a band across the middle black, with rows of strong punctures set in rather fine striæ, interstices rugosely punctured; antennæ black, fuscous at apex, legs black and pubescent. L. 7 mm.

Very local but occasionally abundant where it occurs, under stones and refuse or at the roots of trees in damp and marshy places: taken in numbers near Cambridge by Dr. Power; Cambridgeshire and Lincolnshire fens; Berkshire; Sandgate; Hythe; Robertsbridge, near Hastings.

***P. quadripustulatus*, St.** Very like the preceding but smaller; thorax longer, almost circular, more strongly contracted behind with the strong rugose punctuation less close and more confluent; the colour of the elytra is darker, and the two markings behind the central fascia are round (and not angular as in *P. crux-major*), leaving a larger black space at apex; the punctured striæ of the elytra are stronger, and the interstices narrower and more convex. L. 6 mm.

Found under the same circumstances as the preceding, but in drier districts and localities; usually on chalky hill-sides and in sandy places beneath moss, stones, &c., or at roots of grass; said to be rarer than the preceding, but it appears to be more often captured; Essex Coast; Dover; Deal; Betchworth; Mickleham; Box Hill; Sanderstead (near Croydon); Hertford; Hampshire; Sandown (Isle of Wight).

A variety of this species (taken by Mr. Rye) is figured in the Ent. Annual for 1874,

in which the usual transverse central fascia on the elytra is so interrupted as to leave an irregular longitudinal streak of red colour on each elytron instead of the usual two spots; the corresponding variety in *P. crux-major* is the *P. trimaculatus* of Dejean.

LICININA.

This tribe contains two genera, *Licinus* and *Badister*, which in the form of the palpi, general contour, and more especially in the fact that the former has only two joints of the anterior tarsi dilated in the male, while the latter has three, appear to differ so widely that the *Licinina* might well be separated off, and another tribe founded to contain *Badister* and its allied genera (*Diplochila*, *Diculus*, &c.). The points of agreement between *Licinus* and *Badister* are the obtuse emarginate tips of the mandibles, the short forehead and impressed labrum, and the fact that the margin of the elytra is not interrupted behind and has no internal plica; the paraglossæ are free and separated from the ligula in the *Chleniidae*, but in these two genera are soldered to it.

- I. Three joints of anterior tarsi dilated in male; palpi normal;
antennæ with two basal joints glabrous **BADISTER**, *Clairv.*
- II. Two joints of anterior tarsi dilated in male; palpi with the
last joint enlarged and truncate; antennæ with three basal
joints glabrous **LICINUS**, *Latr.*

BADISTER, Clairv.

About twenty species are comprised in this genus, which ranges as far as Siberia, North America, Japan, India and Madagascar. The first two of our species bear a strong resemblance to *Stenolophus Tentonus* and the species allied to it.

The larva of *B. bipustulatus* is figured by Schiödte (vi., Pl. i., Fig. 1). It is long and fusiform, white with the scuta pale ferruginous, and the cerci darker; the head is small and narrow, the prothorax is broader but narrower than the meso- and meta-thorax; all the abdominal segments are angled at the sides; the anal appendage is rather short, and the cerci are stout and a little curved, with long erect hairs, and thickly set setigerous tubercles; they are about as long as the last two segments of the abdomen.

- I. Thorax red.
 - i. Mesothoracic episterna red; head as broad as
thorax; length 7 mm. **B. UNIPUSTULATUS**, *Bon.*
 - ii. Mesothoracic episterna black; head somewhat
variable but narrower than thorax; length 4 to
6 mm. **B. BIPUSTULATUS**, *F.*
- II. Thorax black or black with yellow margin.
 - i. Elytra black with a large humeral yellow spot . . . **B. SODALIS**, *Duft.*
 - ii. Elytra unicolorous black with metallic reflection. **B. PELTATUS**, *Panz.*

B. unipustulatus, *Bon.* Head black, antennæ yellow with the middle black; thorax red, somewhat cordate, very transverse, sides strongly contracted behind, anterior margin considerably broader than posterior; elytra oblong, testaceous red with a broad cyanous patch on each, enclosing a common testaceous spot towards apex, which is variable

in size and sometimes obsolete ; scutellum red ; legs reddish testaceous. L. 7 mm.

Marshy places, at roots of grass, &c. Local and not common. Lewisham, Merton, Putney, Battersea, West Grinstead ; Hythe ; Wiltshire ; Newark.

B. bipustulatus, F. Very like the preceding, but distinguished by its smaller size, narrower head and the black mesothoracic episterna ; the elytra are less deeply striated and the dark patch reaches, as a rule, further towards base, and is less cyaneous ; the scutellum is usually black, but occasionally red. The best character for separating the two species is, perhaps, the shape of the thorax, which in *bipustulatus* is larger, subquadrate, with sides very slightly narrowed behind, and the anterior margin almost as broad as the posterior. L. 4-6 mm.

Damp and marshy places at roots of willows, &c. ; also in moss, under stones, &c., in all sorts of localities ; very common and widely distributed ; Scotland, common, Lowlands. Ireland, near Belfast ; also near Dublin (scarce).

B. sodalis, Duft. (*humeralis*, Bon.). Obscure black, elytra with somewhat cyaneous reflection ; head black, smooth, antennæ yellowish at base and apex ; thorax and elytra with narrow yellowish margins, the former about as long as broad, with sides contracted behind, strong central furrow and two deep depressions at base ; elytra plainly striated with two impressions on the second stria of each, interstices smooth ; suture behind and a broad spot at shoulders yellow ; legs pale yellow. L. $3\frac{1}{2}$ mm.

Not uncommon in marshy places ; also in drier places (chalky districts, &c.) under moss and dead leaves ; rather local, but widely distributed. Darenth Wood, Kent ; Mickleham and many other localities in Surrey ; Tonbridge ; Henley ; Bath ; Southampton ; Newnham-on-Severn ; Carlisle ; Northumberland. Doubtful as Scottish (recorded by Leach from Loch Awe, but Dr. Sharp considers that this is almost certainly an error). Ireland, near Belfast.

B. peltatus, Panz. Shining black with a strong cyaneous reflection, especially on the elytra ; margins of thorax and elytra at the extreme edge brownish or yellowish, but this is often hardly perceptible ; thorax and elytra much the same as in the preceding in shape and sculpture, except that the thorax is rather more transverse and has the sides less rounded in front, and the elytra are broader ; legs dusky testaceous. The insect bears a very strong resemblance to a small *Anchomenus*. L. $4\frac{1}{2}$ mm.

Very local and rare ; in marshy places ; Notting Hill and Hammersmith Marshes (Dr. Sharp and others) ; Balcombe, Haywards Heath (Dr. Power) ; Cowbit Marsh, near Spalding (Mr. Rye and Archdeacon Hey) ; Shipley, Horsham, and Isle of Wight (Mr. Gorham) ; Portsmouth ; Hythe (Mr. Champion).

LICINUS, Latreille.

The species of *Licinus* are rather large, black, depressed insects ; they are about fifteen in number, and are confined to central and southern Europe, Egypt, Syria, and Algeria, with the exception of one species

from the Canaries. Dr. Horn (Carabidæ, p. 140) says that on one or two occasions *L. silphoides* has been found in North America, but under circumstances that induce him to believe that it has been introduced. The genus *Licinus* seems to bear a relationship to *Panagæus* in the formation of the palpi and the fact that both genera have two joints of the anterior tarsi of male dilated and clothed beneath with fine short erect hairs.

The larva of *L. silphoides* (*brevicollis*, Dej.) is figured by Schiödt (vi., Pl. ii., Fig. 1), and is described as well by Mulsant et Mayet (Opusc. xv., 1872, p. 81). It is rather broad in comparison with some of its allies; the head is very small, the prothorax strongly narrowed in front, narrower than the succeeding segments; the dorsal shields are strongly margined and raised on each side, with large muscular depressions; to the side of each segment is attached a conical process terminating in a large seta; the cerci are black, short, stout, and strongly divergent; the larva is red with the shields black, except the prothoracic one which is yellow, with a median band and the margins fuscous; the claws are equal; the very young larva differs considerably from the adult by its larger head and longer cerci, and the absence of the lateral appendages. This larva feeds on young woodlice and phytophagous larvæ, and undergoes its transformation in a cocoon which it forms under stones (Bedel l. c., p. 59, note).

- | | |
|---|---------------------|
| I. Insect broad, winged; interstices of elytra coarsely and
rugosely punctured | L. SILPHOIDES, F. |
| II. Insect rather narrow, apterous; interstices of elytra
finely punctured | L. DEPRESSUS, Payk. |

L. silphoides, F. (*granulatus*, Dej.; *brevicollis*, Dej.). Black, the male more shiny than the female, which is very dull; thorax almost double as broad as the head, transverse, anterior and posterior margins strongly emarginate, angles rounded, with fine central furrow; elytra oval, strongly emarginate before apex, striated, the striae coarsely punctured, the interstices with large rugose punctures, the third, fifth, and seventh somewhat raised. L. $10\frac{1}{2}$ – $12\frac{1}{2}$ mm.

Local, but not uncommon in chalky districts on the hill-sides and coast, at roots of grass, under stones, &c.; sometimes found under sea-weed. Folkestone, Chatham, Hythe, Box Hill, Reigate, and other localities in Kent and Surrey; Swannage, Dorset; Chesil Bank; Weymouth; Lewes; apparently confined to the south and south-eastern counties of England.

L. depressus, Payk. Smaller than the preceding and much narrower; black; head and thorax rather shiny, elytra dull in female, more shiny in male; head broader in proportion, and thorax longer with central furrow very indistinct; elytra with shallow but evident finely punctured striae; interstices flat, thickly and rather finely punctured. L. 8–10 mm.

Very local; chalky districts, under stones, at roots of grass, &c.; Dover; Folkestone; Canterbury; Box Hill; Gomshall; Dorking; Chatham; Deal; Winchester; Lewes; Worthing; recorded by Mr. Bold as very rare on the sea coast near Hartlepool, and Castle Eden, Durham.

CHLÆNIINA.

This tribe has no very striking characteristics, but is chiefly remark-

able for the beauty of the species which belong to it. Two genera belong to our fauna, *Chlœnius* and *Callistus*; in the latter the outer lobe of the maxillæ is formed of one piece, no trace even of a suture being left as is the case in the genus *Amerizus*, Chaud., in which also the lobe is formed of one piece. For some reasons the species of *Callistus* might be separated off as a distinct tribe; one character, however, on which Chaudoir lays stress, viz. the pubescence of the palpi, is found in some exotic species of *Chlœnius*.

- I. Tibiæ finely pubescent with bristles interspersed; outer maxillary lobe formed of a single piece; mentum with a simple tooth *CALLISTUS*, Bon.
 II. Tibiæ without pubescence, but furnished with short erect bristles; outer maxillary lobe round, articulated; mentum with a bifid tooth *CHLÆNIUS*, Bon.

CALLISTUS, Bonelli.

This genus comprises about ten species, which are widely distributed over the Old World. No species appears to be found in America; there is only one European representative, which is one of the handsomest of our insects.

C. lunatus, F. Head large, metallic blue or green, strongly punctured, antennæ dusky with base testaceous; thorax testaceous red, strongly cordate, very finely and closely punctured; elytra ovate, very finely striated, testaceous yellow, with a humeral spot, a broad fascia about middle not reaching suture, and a broad fascia near apex reaching suture, black; the two latter fasciæ are connected at margin; underside bluish black; legs yellow, apex of femora, base of tibiæ, and last four joints of tarsi more or less black or brownish. L. 6 mm.

Very local, but taken in some numbers where it occurs; confined to chalky districts; found at roots of grass, and occasionally running about in the sunshine; Folkestone; Canterbury; Dover; Reigate; Caterham; Mickleham; Croydon, &c.

CHLÆNIUS, Bonelli.

This genus contains about 400 species, which are widely distributed throughout the world; they are for the most part brightly metallic-coloured, usually green with a more or less coppery reflection, and as a rule covered with fine silky pubescence; they are among the most beautiful of the Coleoptera; they exhale a strong and somewhat ammoniacal odour; they are found as a rule under stones and rubbish in marshy places, or on the borders of streams and rivers, sometimes at the roots of plants. We possess only four species, of which two are exceedingly rare the European list contains between thirty and forty.

The larva of *C. vestitus* is figured by Schiödte (iii., Pl. xx., Fig. 3). It is comparatively broad, but linear and slightly fusiform, upper side scantily pubescent with: the corneous parts finely reticulate; the colour is white, with all the scuta of the upper

side black with a green metallic reflection; the head is mostly yellow, much narrower than prothorax, which is large and subquadrate, a little narrowed in front; the muscular impressions on all the segments are large and well marked, those on the prothorax being the smallest; the cerci are about twice as long as the anal appendage, yellow, with base and apex black; the claws are of equal length. In the larva of *C. nigricornis* the colour of the dorsal shields is aeneous-black, and the whole cerci are black; the form, too, is flatter and more robust. The larva lives in damp places, and runs actively in the sunshine.

I. Elytra with yellow border; epipleuræ yellow *C. VESTITUS*, Payk.

II. Elytra without yellow border; epipleuræ concolorous with elytra.

i. Upper surface strongly metallic, greenish or reddish bronze; prosternal process punctured between coxæ.

1. Antennæ with two or three first joints red; posterior angles of thorax well marked *C. SCHRANKII*, Duft.

2. Antennæ with first joint only red; posterior angles of thorax very blunt, almost rounded *C. NIGRICORNIS*, F.

ii. Upper surface very slightly metallic of a silky fuscous colour; prosternal process not punctured between the coxæ

C. HOLOSERICUS, F.

C. vestitus, Payk. (*viridipunctatus*, Geze). Head and thorax green, mouth palpi and antennæ testaceous; thorax subcordate, rather long, with sides rounded from below the anterior angles to behind middle and thence straight to base, posterior angles right angles; central furrow of thorax abbreviated in front and behind, not reaching margins; elytra much broader than thorax, dull green, with rusty yellow pubescence, with lateral margins narrowly and apex broadly yellow, striated, interstices finely granulated; legs testaceous. L. 9-11 mm.

Under stones and refuse in damp places; rather local, but widely distributed. Common in the London district; Kent; Somerset; Repton; Towkesbury; Cannock Chase; Isle of Wight; not recorded from the north of England or Scotland; Ireland, near Dublin, and other localities.

C. Schrankii, Duft. (*nitidulus*, Schrank). Head brilliant green, thorax and scutellum coppery; antennæ dark, with three basal joints red; mouth parts red; thorax coarsely and deeply punctured, punctures often confluent, with central furrow not so plainly marked as in the preceding species, abbreviated before and behind, posterior angles distinct, prominent; elytra greenish, sometimes bluish, with thick and close rusty yellowish pubescence, striated, interstices finely granulated; legs reddish testaceous, femora darker. L. 11-12 mm.

Very rare; Kemp Town, Brighton, one example (Dr. Power); Luccombe Chine, Isle of Wight, in some numbers (Mr. G. Lewis); found in damp places in moss, &c.

C. nigricornis, F. Very like the preceding, but easily distinguished by its rather smaller form, less smooth head, rounded posterior angles of thorax, and the fact that the mouth, antennæ (except one lighter basal joint), and legs are pitchy black: the tibiæ are lighter towards apex. L. 10-11 mm.

The var. *melanocornis*, Dej., has the mouth, and the first and some-

times the second and third joints of the antennæ, and also the legs, red; the shape of the thorax, however, will at once distinguish it from *C. Schrankii*.

Rather common in marshy places and on the banks of streams and rivers; widely distributed in England from north to south. Scotland, rare Lowlands. Ireland near Belfast. Some specimens are very darkly coloured, and superficially might be mistaken for the following species.

C. holosericeus, F. (*tristis*, Schall.). Rather larger and broader than *C. nigricornis*; head obscurely bronzed or coppery, antennæ black; thorax subquadrate, rather broader than long, hinder angles obtuse, obscure dusky black, rugosely punctured; elytra brownish black, striated, interstices thickly rugose and granulated; pubescence very thick, yellowish brown. L. $10\frac{1}{2}$ – $11\frac{1}{2}$ mm.

Very rare. Fen Ditton, Berks, and Whittlesea Mere (Stephens); Hornsea, Yorkshire, and Norfolk (Skrimshire); Mr. W. Garneys has recorded a specimen (doubtfully) from Repton; it is very probable that some of these specimens were dark varieties of the preceding. Dr. Power some years ago took twelve specimens at Burwell Fen, and Mr. S. Stevens captured seven specimens on the banks of Lough Derg, near Killaloe, Ireland, in May, 1870 or 1871.

OODINA.

This tribe is included by Dr. Horn and other writers under the Chlœniina, but, besides other differences, its members are so wholly different in formation from the Chlœnii that it would seem better to separate them.

OODES, Bonelli.

This genus comprises about sixty species, of which about a fifth part come from the Australian region; it ranges as far as China, Java, India, Madagascar, Sierra Leone, Brazil, Peru, Mexico, Texas, &c.; there are only three European species, one of which, *O. Hispanicus*, is sometimes separated off as a distinct genus, *Lonchosternus*, Laf.

O. helopioides, F. Oblong-ovate, deep black, antennæ black, first joint pitchy; head and thorax smooth, the latter narrowest in front and gradually widened to base, with very indistinct central furrow; elytra as broad as thorax, almost parallel-sided, with apex broadly and abruptly rounded, and striæ plain, indistinctly punctured; underside thickly punctured at sides; legs black, tarsi pitchy; the female is duller, and has the apex of the elytra more truncate than the male. L. 8–9 mm.

Very local and rather rare; in fens and marshy places under refuse, &c.; sometimes found climbing up the rushes, also at the roots of willows; Cambridgeshire Fens; Tonbridge; Askham Bog, York; Portsmouth; Weston, Oxfordshire; Burton-on-Trent; Cowley, Merton (near London), Eltham, Wimbledon, Rusper, &c.; apparently not found further north than York, and not recorded from Ireland.

Sub-Div. iii. **Quadripalmati.**

This division includes those genera which have four joints of the anterior tarsi dilated in the male; as a rule the middle tarsi are dilated as well, although in some genera, e.g. *Acupalpus* and *Bradycellus*, they are very feebly dilated or not at all; in some genera, e.g. *Gynandromorphus*, the female has one or more joints of the anterior tarsi dilated. The most important genus of the tribe is *Harpalus*.

- I. Dilated joints of anterior tarsi of male biserially squamulose beneath.
 - i. Labial palpi with the terminal joint equal to, or a little longer than the preceding, which is bisetose only **STENOLOPHINA.**
 - ii. Labial palpi with the terminal joint shorter than the preceding, which has several setae in front **HARPALINA.**
- II. Dilated joints of anterior male tarsi clothed beneath with fine, short, erect hairs **ANISODACTYLINA.**

STENOLOPHINA.

With regard to this tribe Mr. Bates (Biol. Cent. Amer. Carabidæ, p. 70) writes as follows:—"The genera *Stenolophus*, *Bradycellus*, *Tachycellus*, and their allies, usually associated with the Harpalina, are distinguished from that group, as Dr. Horn has pointed out, by the penultimate joint of the labial palpi bearing two setae only. With this character are associated many other points of difference, curved frontal foveæ, and the constant presence of a single fovea on the third elytral interstice. These insects are of much smaller size than the great majority of the true Harpalina, and are readily distinguished from them by their facies. In short, they form a natural group, and the dilated tarsal joints of the male being furnished with squamules, they bear the same relation to the Harpalina proper, as the Pelmattellina do to the Anisodactylina. Some genera seem to be intermediate in the nature of the clothing of the dilated tarsal soles of the male."

- I. Penultimate joint of anterior and middle tarsi bilobed, and the middle tarsi dilated, in male **STENOLOPHUS, Dej.**
- II. Penultimate joint of anterior and middle tarsi simply emarginate, and the middle tarsi not or feebly dilated, in male.
 - i. Mentum not toothed **ACUPALPUS, Latr.**
 - ii. Mentum with a central tooth **BRADYCELLUS, Er.**

STENOLOPHUS, Dejean.

About seventy species are comprised in this genus, which are widely distributed over the surface of the globe; they are all of small size, and are often variegated with bright colours; they are found in damp places under stones and refuse, and sometimes on low plants: about twelve species are found in Europe, of which we possess four as British.

The larva of *Stenolophus* is figured by Schiölte (iii., Pl. xii., Fig. 12). There is nothing very remarkable about it; it is linear, depressed, smooth and shining, with

long erect setæ on the head and scuta; the head is dark ferruginous, rather narrower than the prothorax, which is of the same colour; the rest of the dorsal scuta are much paler; the apical anal appendage is rather long, nearly equal in length to the cerci, which are about three times as long as the ninth segment of abdomen; the abdominal dorsal shields are raised in two transverse series; the claws are unequal; the larva is found at the roots of grass, &c.

I. Antennæ with at least two basal joints reddish.

i. Average length 6 mm.

1. Elytra longer with large dark well-defined markings extending from apex to beyond middle S. TEUTONUS, *Schr.*

2. Elytra shorter with indistinct dark markings towards apex S. SKRIMSHIRANUS, *Steph.*

ii. Length not exceeding 4 mm. S. ELEGANS, *Dej.*

II. Antennæ with one basal joint reddish S. VESPERTINUS, *Panz.*

S. Teutonus, *Schr.* (*vaporariorum*, F.). Head black; thorax red, quadrate, sides scarcely rounded, posterior angles obtuse, with very indistinct dorsal furrow; elytra with sides almost straight, striated, interstices flat, with a large blue-black patch extending from apex to beyond middle, base red; legs testaceous; underside black, except of thorax which is red. L. 6 mm.

The var. *abdominalis* has the abdomen red; in the only specimen that I possess (from the Morea) the antennæ are lighter and the black markings less defined than in the type form.

Local; in marshy places at roots of grass, &c.; apparently confined to the mid- and south-eastern and southern counties of England. Formerly plentiful in Battersea Fields and Hammersmith Marshes, and at Notting Hill; Greenwich; Shirley; Dulwich; Woking; Barnes; Woolston, Hants; Bournemouth; Southampton; Luccombe Chine, Isle of Wight; Cambridgeshire Fens.

S. Skrimshiranus, *Steph.* (*melanocephalus*, Heer.). "Very like the preceding, but slightly smaller, and having the elytra entirely rufous with the exception of a dusky, more or less indistinct iridescent cloud at their extremity which blends with the rufous colour" (Daws. Geod. Brit. 155); thorax rather shorter and elytra more narrowed at the shoulders than in the preceding species, striae deeper, interstices more convex; underside as in the preceding species; legs somewhat paler. L. $5\frac{1}{2}$ mm.

Local; marshy places, in moss and flood refuse, and at the roots of grass; Niton, Isle of Wight; Sheerness; Sheppy; Lee, Kent; Lymington Salterns; Hythe; Lewes; Alverstoke; Cambridgeshire Fens; formerly abundant in Hammersmith Marshes and at Notting Hill.

S. elegans, *Dej.* Much smaller than the preceding; head black, antennæ dark except first two joints, which are yellow; thorax subquadrate, but rather transverse, posterior angles rounded, red, or testaceous, either immaculate or with disc more or less broadly dark; elytra short, with sides somewhat parallel, slightly emarginate before apex, testaceous, with a dark, somewhat cyaneous patch behind middle not covering suture or apex; the region of the scutellum is often dark; underside black,

legs reddish testaceous, femora darker at apex. The colour of this insect is variable; occasionally a variety occurs with immaculate elytra.

Rare; salt marshes, under stones and in flood refuse. Banks of Thames towards Gravesend and Sheppy (Dr. Power); Sheerness (Mr. Douglas, Mr. S. Stevens, and Mr. J. J. Walker); Deal (Mr. W. West).

S. vespertinus, Panz. (*micrus*, Herbst.). Rather variable in colour, sometimes brown-black, sometimes partly or almost entirely testaceous; head always black or dark, antennæ dark with the first joint only testaceous; thorax usually dark with yellowish margins, more quadrate and with the posterior angles less rounded than in *S. Skrimshirans*; basal foveæ broader and more distinctly punctured than in either of the preceding species; elytra variable but usually dark with cyanous reflection, with margins and space at shoulder more or less testaceous; underside black, legs pale testaceous. L. $5\frac{1}{2}$ mm.

Local; in marshy places; Whittlesea Mere; Norfolk; Sussex; Wimbledon; Chatham; Lee, Kent; Sheerness; Weybridge; Shipley, near Horsham; Tonbridge; Deal. Recorded by Bold among the Coleoptera of Northumberland and Durham.

ACUPALPUS, Latreille.

The insects that form this genus are among the smallest of the Carabidæ; they are very often united with the true *Stenolophi*; it would seem, however, better to separate them on the formation of the anterior tarsi of the male; in habits they resemble the members of the preceding genus.

The genus *Acupalpus* contains about as many species as the genus *Stenolophus*; they are very widely distributed over the Old and New Worlds, reaching as far north as Siberia and as far south as Caffraria, Chili, and Patagonia; there are about fifteen European species.

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| I. Posterior angles of thorax blunt or rounded; abdomen glabrous. | |
| i. Thorax uniformly reddish yellow; posterior angles rounded | A. FLAVICOLLIS, Sturm. |
| ii. Thorax testaceous with darker disc more or less defined, but very variable in colour. | |
| 1. Thorax not narrowed behind; posterior angles rounded | A. DORSALIS, F. |
| 2. Thorax narrowed behind; posterior angles blunt | A. EXIGUUS, v. <i>luridus</i> , Dej. |
| iii. Thorax entirely dark. | |
| 1. Elytra unicolorous pitch black. | |
| A. Thorax distinctly narrowed behind with basal impressions smooth; length $2\frac{1}{2}$ mm. | A. EXIGUUS, Dej. |
| B. Thorax with anterior and posterior margins of equal breadth, basal impressions broad, punctured; length $3-3\frac{1}{2}$ mm. | A. BRUNNIPES, Sturm. |
| 2. Elytra black, with base and suture yellow | A. MERIDIANUS, L. |
| II. Posterior angles of thorax right angles; abdomen finely pubescent | A. CONSTITUS, Dej. |

A. flavicollis, Sturm. Head black, antennæ brownish, base testaceous; thorax reddish testaceous, transverse, as broad in front as behind, posterior angles rounded; elytra darker or lighter red, with suture and more or less of disc paler, rather wide, sides almost parallel; legs pale. L. 3 mm.

Local and rare; marshy places, amongst debris of reeds, &c. Not uncommon at Luccombe Chine, Isle of Wight, where Dr. Sharp, Mr. Gorham, and I obtained several specimens in April, 1885; Lyvington Salterns; Deal; Chatham; Esher.

A. dorsalis, F. (*Gyllenhali*, Thoms.). Head black, antennæ except first basal joint dark; thorax testaceous with a dusky patch in the middle of disc, sometimes entirely covering it and leaving only extreme margins light, sometimes almost, if not quite, obsolete, transverse, posterior angles completely rounded; elytra oblong, with sides slightly rounded, sometimes testaceous with a dark patch behind on each side of suture, sometimes almost entirely dark, sometimes altogether testaceous; legs more or less pitchy or testaceous. L. 3–3½ mm.

Local, but not uncommon; marshy places, in moss and at the roots of grass. Wimbledon, Wandsworth, Chatham, and many other places in the London district; Deal; Bournemouth; Stapleford Common, near Newark; Holme Fen, Huuts; Scotland, rare Lowlands, Solway, Clyde.

A. exiguus, Dej. Entirely pitch black, antennæ pitchy, first one or two joints lighter; thorax narrowed behind, posterior angles very blunt; elytra somewhat widened behind middle, finely striated; legs lighter or darker pitchy. L. 2½ mm.

The var. *luridus* (considered a distinct species by Dawson and other authors) is fusco-testaceous, with the thorax reddish, more or less clouded with black, and the antennæ and legs lighter: it is rather larger than the type form, and according to Dawson (Geod. Brit. p. 161) is narrower and more depressed, with narrower thorax which is more contracted behind; there does not, however, seem to be any real structural difference between the two insects.

The type form is found on sandy coasts and on banks of rivers, at roots of grass, in flood refuse, &c.; it is rather local but not rare in the London district, where it occasionally occurs in abundance unaccompanied by the variety; it appears not to be met with in the extreme north of England, or in Scotland or Ireland.

The variety appears to be commoner and more widely distributed than the type; it is included among the Irish species, and is recorded by Dr. Sharp from one Scotch district, Solway; it is found under the same conditions.

A. brunnipes, Sturm. This insect closely resembles *A. dorsalis* in structure, and has been considered a variety of that species; in fact it is still doubtful whether it ought not to be so considered, for the punctuation of the posterior angles of the thorax, which is the character on which it has mainly been kept separate, has been proved by M. Bedel not to be always constant: except, indeed, that it is rather larger than the type, it seems to bear much the same relation to *dorsalis*, that

eriguus does to *luridus*; the entire upper surface is pitchy, antennæ except first joint dark, legs pitchy or reddish brown: as a rule the posterior angles of the thorax are coarsely and deeply punctured. L. $3\frac{1}{3}$ mm.

Marshy places; on heaths, in Sphagnum; also on the coast at roots of plants near the shore; rare. Esher; Chobham; Woolston, Hants; Bournemouth, not uncommon in a sandy ravine near the coast a little to the west of the town; taken by Dr. Power at Horsell, Woking, Weybridge, Wimbledon, and Farnham.

A. meridianus, L. Head and thorax black, the latter occasionally brownish red, but always unicolorous, antennæ rather variable in colour, but lighter at base; thorax a little longer than broad, contracted behind, posterior angles very blunt, deeply punctured at base, with strong central furrow; elytra oblong, very slightly widest behind middle, black, with the base and suture more or less widely testaceous; underside black, legs testaceous. L. $3-3\frac{1}{2}$ mm.

Damp places, at roots of grass, &c.; also at the bottoms of haystacks in winter; very common and widely distributed over the midland and southern districts of England, but not recorded from the extreme north, or from Scotland or Ireland.

A. consputus, Duft. (*Anthraxus*, Mots.). Elongate, narrow; head dark, antennæ long, fuscous, with the first two joints yellow; thorax reddish, sometimes darker on disc, somewhat cordiform, side margins rather strong, posterior angles right angles; elytra long, sides somewhat parallel, deeply striated, lighter or darker testaceous, with a large oblong bluish-black patch behind, extending more or less upwards, but always leaving base, suture, and margins pale; underside black, except apex of abdomen, which is testaceous; legs testaceous. L. 4 mm.

Dark specimens of this species may easily be confounded with *Badister sodalis*, which it closely resembles; the shape of the thorax will separate it from all other species of *Acupalpus*; *A. meridianus*, indeed, bears a slight resemblance to it in this respect, but may be immediately distinguished by its shorter and broader elytra, shorter antennæ, and dark, unicolorous thorax, and by the deeply punctured base of the latter.

Marshy places, in moss, &c.; rather common in Kent and Surrey; Lee, Chatham, Sheerness, Dulwich, Barnes, Wimbledon, Weybridge, Battersea; formerly abundant at Notting Hill, and recorded from Windsor and Dorchester; apparently almost confined to the south and south-eastern counties of England, but it has been taken by Dr. Power at Lytham in Lancashire, and may have been overlooked, as it is very local.

(*A. derelictus*, Daws. This insect, described by Dawson (Geod. Brit. 159) as pitchy black, with thorax reddish pitchy with its margins testaceous, and legs testaceous, is said by him to be about the size of *A. dorsalis*, but rather wider; it is also, he says, allied to *A. brunipes*, but is broader, paler, less convex, with the base of the thorax depressed, and the basal foveæ entirely smooth and impunctate. One specimen only has occurred, taken by Mr. F. Smith at Plumstead, Kent, many years ago, and this, if it is yet in existence, still remains unique. In all

probability it must be regarded as a variety of *dorsalis*, and perhaps as a further connecting link between *dorsalis* and *brunniipes*.)

BRADYCELLUS, Erichson.

This genus includes upwards of fifty species, which are widely distributed over almost the whole of the northern hemisphere, ranging from Siberia, Kamtschatka, and Lake Superior to the Canaries and Madeira; we possess as British the majority of the European members of the genus. The Bradyelli proper are small insects usually of a brownish or reddish colour; a considerable number of authors include in the genus the species of *Dichirotrichus*, which however appear to find a better position near *Scybiatus*: this is, however, a doubtful point, as the clothing of the underside of the tarsi in *Dichirotrichus* is partly pubescent and partly squamose. They are found in damp warm localities, under leaves and refuse on the banks of ponds situated in sunny places in woods, &c., or in moist places on the sides of hills and cliffs, &c.

The following table may be of some service in distinguishing the species that belong to our fauna, but several of them come so close to one another, and present such almost imperceptible gradations of form and colour, that no table can be quite satisfactory, although it is not difficult to distinguish the species when once their differences have been mastered. Many writers divide them into groups by the presence or absence of the short scutellary stria, but in *B. collaris* it is sometimes plain, sometimes obsolete. Again, *B. cognatus* and *placidus* may be nearly always known by the broader or narrower testaceous margins of the thorax, but in many instances, especially in northern examples, the thorax is quite black; *B. similis* also has the suture, as a rule, very distinctly lighter, but this character is also sometimes absent in Scotch specimens, and is to a slighter degree present in other species. *B. similis* is our only type of the subgenus *Tachycellus* which has three basal joints of the antennæ glabrous (instead of two as in the other species), and the intermediate tarsi of male very slightly dilated, but with traces of squamæ underneath.

I. Length 4–4½ mm.

i. Scutellary stria wanting; colour pitchy or testaceous.

1. Legs testaceous—thorax, as a rule, with margins broadly testaceous *B. PLACIDUS*, Gyll.
2. Legs pitchy black, tibiæ lighter—thorax, as a rule, with margins narrowly testaceous *B. COGNATUS*, Gyll.

ii. Scutellary stria distinct; colour more or less rufous or ferruginous.

1. Posterior angles of thorax distinct and prominent . . . *B. DISTINCTUS*, Dej.
2. Posterior angles of thorax obtuse, but distinct at apex . . *B. VERBASCI*, Duft.
3. Posterior angles of thorax rounded *B. HARPALINUS*, Dej.

II. Length 3–3½ mm.

1. Upper side ferruginous; legs stouter; basal furrows of thorax broader and shallower; antennæ with two basal joints at most glabrous *B. COLLARIS*, Payk.

2. Upper side pitchy, suture, as a rule, testaceous; legs more slender; basal furrows of thorax narrower and deeper; antennæ with three basal joints glabrous . . . *B. SIMILIS*, Dej.

B. placidus, Gyll. Head large, eyes prominent, antennæ somewhat variable, but usually fuscous with three basal joints testaceous; thorax reddish testaceous, with a dark patch in the middle, which sometimes is small, but sometimes is spread over the whole disc, posterior angles almost rounded; elytra testaceous with a narrower or broader black stripe near suture, the latter being always pale; legs pale testaceous. L. 4 mm.

Local. Whittlesea Mere and Wicken Fen; Aspell, Suffolk; banks of Thames; Shirley; Lincoln; north of England; Scotland, local, Lowlands, Highlands, Tweed, Tay, Dee, Moray.

B. cognatus, Gyll. (*Deutschii*, Sahl). Very like the preceding, but slightly smaller, darker, and very finely pubescent; thorax with margins as a rule more narrowly testaceous, and with posterior angles more rounded; elytra varying in colour in different specimens, but with the dark markings generally more widely spread over the disc than in *B. placidus*: the striæ also are less deep and the sides less dilated behind than in that species; legs pitchy black, tibiae lighter. L. 4 mm.

Local; on heaths and mountains in high districts, but occasionally found in lowland localities. Cannock Chase, Coleshill, Sutton Park; North Wades; in profusion near Llangollen; Cheshire; said to have occurred near Bournemouth; north of England; Scotland, common in highland and alpine districts; Ireland, near Belfast.

B. distinctus, Dej. (*cordicollis*, Wesm.). Dark ferruginous red; head large; thorax with sides rounded in front, contracted behind, posterior angles sharp and distinct, base coarsely punctured; elytra convex, with sides somewhat rounded, deeply striated, third interstice without the usual pore; legs and antennæ red. L. $4\frac{1}{2}$ mm.

Damp places in moss and at the roots of grass, also under leaves and refuse near ponds; widely distributed and not uncommon in the middle and south of England, very rare in the north; Scotland very rare, Lowlands, near Dumfries and Thornhill.

B. verbasci, Duft. (*rufulus*, Dej.). Very like the preceding, but usually of a light red colour; thorax nearly quadrate with the posterior angles blunt but distinctly visible; elytra variable in colour, sometimes quite light, at other times much darker, sometimes light with darker markings on each elytron; it is also rather variable as to size. L. $4\frac{1}{2}$ mm.

Common and generally distributed in England; Scotland, common Lowlands; Ireland, common near Dublin, and near Arragh.

B. harpalinus, Dej. (*falsus*, Fairm.). Closely allied to the preceding, but darker and more convex; thorax with posterior angles very

blunt, so that they appear rounded; striæ of elytra deeper. L. $4-4\frac{1}{2}$ mm.

Common and generally distributed in England; Scotland, not common, Lowlands.

B. collaris, Payk. Considerably smaller than *B. harpalinus*, but otherwise very closely resembling that species; the scutellary stria, however, is more obsolete, and the furrows at the base of the thorax not so deep or wide, and not so thickly punctured; the elytra are shorter in proportion, the striæ rather deeper, and the interstices more convex. L. $3\frac{1}{3}$ mm.

A mountain species found on the high moors of North Wales, Yorkshire, and Lancashire; Langdale Pikes; Skiddaw. Scotland, generally distributed over the Lowlands and Highlands, but not common. Ireland, near Dublin.

B. similis, Dej. (*Tachycellus*, Mor.). The smallest species of the genus, pitchy, or pitchy black, with the thorax sometimes red, and the suture of the elytra usually reddish testaceous; thorax slightly narrowed behind, posterior angles rounded or very blunt, base with a deep punctured fovea on each side; elytra broadest behind middle, with plain striæ, the outer ones obsoletely punctured; legs pitchy. L. 3 mm.

Heaths and sandy places, &c.; common and generally distributed throughout England and Scotland.

HARPALINA.

The Harpalina contain one genus, *Harpalus*, which, for convenience sake, may be divided into three sub-genera as follows:—

- | | |
|---|----------------------------|
| I. Head, thorax, and interstices of elytra thickly punctured throughout | OPHONUS, <i>Steph.</i> |
| II. Head smooth, thorax punctured (except on centre of disc which is smooth); interstices of elytra punctured throughout | PSEUDOPHONUS, <i>Mots.</i> |
| III. Head smooth; thorax smooth (except at base and extreme sides); interstices of elytra smooth (except occasionally at sides) | HARPALUS, <i>i. sp.</i> |

HARPALUS, Latreille.

The sub-genus *Ophonus* contains about sixty species, which are chiefly spread over the northern hemisphere, although species are found as far south as Guinea; the genus *Harpalus* proper (under which the sub-genus *Pseudophonus* is generally included) numbers upwards of three hundred and fifty species, which are widely distributed throughout the globe, although the majority are attached to the northern hemisphere. The habits of the insects composing the sections are as a rule the same, except that some of the *Ophoni*, like *Zabrus*, seem to be to a certain extent graminivorous; they are chiefly, although not altogether, nocturnal, and during the day hide themselves in burrows which they dig under stones, and at the roots of plants, &c.; like other usually nocturnal Carabidæ, they may

often be seen running in the sun in spring and early summer. The species of *Harpalus* proper are extremely variable in size, colour, and sculpture, even individual species (e.g. *H. æneus*) presenting an endless variety of shades. The males have joints 1-4 of the anterior and intermediate tarsi dilated, and furnished with squamæ beneath; three species of *Ophonus*, however (as M. Bedel remarks, l. c. p. 69), have the tarsi simple in both sexes; these are *cordicollis* Serv., *dermatodes* Fairm., and *femorialis* Coq.

The larva of *Harpalus æneus* is figured by Schiödte (iii., Pl. xxii., Fig. 1). It is depressed and cylindrical, gradually narrowed from the head, which is broader than any of the other segments, to the ninth abdominal segment, which is narrow and bears two short rather stout cerci; the anal appendage also is short and thick; the thorax is convex with the scuta margined, but none of the other scuta are margined; the colour is white, with the head, prothorax, and all the dorsal scuta yellow; the muscular impressions on the abdominal scuta are distinct; claws slightly unequal: the larva digs burrows in sandy ground. The larva of *H. ruficornis* differs from that of *H. æneus* in being half as large again, and rather more depressed, in the form of the ninth abdominal segment, and in having the cerci thicker and less widely separated.

(Sub-Gen. i. **Ophonus**, Stephens.)

I. Upper surface of elytra metallic, blue or green.

i. Length 10-13 mm.

1. Sides of thorax rounded from apex to middle, and thence obliquely contracted to base; posterior angles blunt, but distinct

II. SABULICOLA, *Panz.*

2. Sides of thorax rounded from apex to base; posterior angles rounded, or nearly so.

- A. Sides of thorax slightly rounded; posterior angles somewhat apparent. L. 13 mm.

II. OBSCURUS, *F.*

- B. Sides of thorax strongly rounded; posterior angles completely rounded off. L. 11-12 mm.

II. ROTUNDICOLLIS, *Fairm.*

ii. Length 6-8 mm.

1. Thorax with posterior angles right angles, without trace of basal border

II. PUNCTATUS, *Duft.*

2. Thorax with posterior angles blunt, base lightly bordered

II. AZUREUS, *F.**

II. Upper surface not metallic, brownish or reddish.

- i. Thorax very strongly contracted at base, apex of posterior angles opposite the axis of the fifth stria of the elytra

II. CORDATUS, *Duft.*

- ii. Thorax not very strongly contracted at base, apex of posterior angles opposite the axis of the sixth stria of the elytra

1. Thorax not strongly transverse.

- A. Form more elongate; thorax without trace of basal border; interstices of elytra more coarsely punctured

II. RUPICOLA, *Sturm.*

- B. Form broader; thorax often with basal border; interstices of elytra more finely punctured

II. PUNCTICOLLIS, *Payk.*

* The var. *similis* of *H. azureus* is dark pitchy-red or brownish, scarcely, if at all, metallic, and might be referred to the second section.

2. Thorax strongly transverse.

- A. Thorax shorter, with central furrow and basal foveæ distinct. L. 6-7 mm. . . . *H. RUFIBARBIS*, F.
 B. Thorax longer, with central furrow and basal foveæ indistinct. L. 5½ mm. . . . *H. PARALLELUS*, Dej.

H. sabulicola, Panz. Oblong, somewhat pubescent; head and thorax pitch black, strongly punctured, antennæ and palpi red; thorax broader than long, rounded in front, obliquely contracted from middle to base, with blunt but distinct posterior angles, strongly punctured, punctuation at base thicker and closer, with very fine central furrow; elytra blue, often with greenish reflection, broader than thorax, somewhat parallel-sided, not emarginate before apex, plainly striated, interstices thickly punctured; legs red. L. 12-13 mm.

Chalky and sandy places, near the coast, under stones, &c.; not common; occasionally found further inland. Box Hill; Folkestone; Deal; Brighton; Gravesend; Dover; Southend; Dorking; Portland. Said by Dawson to be found abundantly under stones and clods of earth near Basingstoke, &c.; apparently confined to the south-east of England.

H. obscurus, F. (= *H. stictus*, Steph., nec *obscurus*, Daws. = ? *monticola*, Dej.). (Fig. Steph. Illust. viii. f. 6.)

This species appears to be intermediate between the preceding and the common *H. rotundicollis*, Fairm.; it is about the size of *H. sabulicola*, if anything rather larger; the posterior angles of thorax are more rounded than in the latter insect, but more visible than in *H. rotundicollis*; the apex of the elytra is deeply excised, and by this and its usually darker colour it may be distinguished from either of these two species. L. 13 mm.

Very rare: Stephens mentions Hackney Marshes as a locality; several specimens were taken many years ago by Dr. Power and Professor Babington at Swaffham in Cambridgeshire, and some of these they distributed as *H. sabulicola*; they probably still exist in old collections under this name. Mr. Matthews has a specimen from Weston, Oxfordshire; the species has not occurred for a very long time in England. Scotland, very rare Solway district, "Raehills, Rev. W. Little," *Murray*, Scot. Nat. viii. 278.

H. rotundicollis, Fairm. (*obscurus*, Daws., *diffinis*, Dej.). Very like *H. sabulicola*, but smaller, with the sides of the thorax completely rounded, posterior angles rounded, not visible; the head and thorax are less closely punctured and the central furrow of the latter is more distinct; the elytra are dark violet blue, and not, as a rule, greenish, as in the above species, and are very slightly sinuate or emarginate at apex. L. 10-11 mm.

This species can hardly be separated from *H. diffinis*, Dej., which only differs in having the sides of the thorax less rounded, and the elytra less sinuate at apex; the sinuation, however, of *H. rotundicollis* is so slight that in some specimens it is hardly perceptible.

Rather common but local in salt marshes, and in chalky fields, on the sides of cliffs, &c., both near the coast and further inland; very common in the Isle of Wight, and on the south coast generally; common in Kent and Surrey. I have never found

it in the north, and it does not appear in the Yorkshire, Durham and Northumberland, Scotch or Irish lists.

***H. punctatulus*, Duft.** Oblong ovate, rather depressed, upper side green or bluish, often rather dull, antennæ and palpi red; thorax broader than long, slightly rounded at sides, and contracted at base, posterior angles sharp right angles; elytra very little wider than base of thorax, interstices of striæ very thickly and closely punctured. L. 8 mm.

Not common; chalky places, in moss, &c.; occasionally brushed from herbage or running on pathways. Chatham, Dartford, Caterham, Lewisham, Croydon, Reigate; Folkestone; near Sandown and Ventnor, Isle of Wight; Bournemouth; Bath; Hunstanton; Colchester; Swansea; Newark. Ireland, near Dublin, Dr. Power.

***H. azureus*, F.** Resembles the preceding, but is shorter, and as a rule more brilliantly coloured; it is generally of a shining bright green colour; the thorax has the posterior angles blunt; the elytra are broader in proportion to the thorax than in *H. punctatulus*, and the interstices are more coarsely and less closely punctured. L. 6-7 mm.

The var. *similis*, Dej., is pitchy with slight metallic reflection on the elytra, and has the interstices of the elytra more strongly punctured; it occurs sparingly with the type.

Local; chalky places under stones and in moss; also at roots of plants and tufts of grass. Rather common in various localities in the Isle of Wight, also at Box Hill, Reigate, Folkestone, Malvern, Bath, &c.; Dover; Bournemouth; Margate; Sheppy; Portland; Swansea; Hertford and other southern or mid-southern localities; not a northern insect.

***H. cordatus*, Duft.** Pitchy or reddish, with thorax often lighter; thorax heart-shaped, strongly rounded in front and very strongly contracted behind, disc convex, posterior angles sharp, prominent; elytra oblong, with striæ often plainly punctured, interstices thickly and finely punctured; antennæ and legs brown red or red, femora sometimes rather darker. L. 7-9 mm.

Rare: the chief locality appears to be Deal, where it is found at the roots of grass. Mr. Champion informs me that it has been recorded from Reigate and other inland localities, but probably in mistake for vars. of *H. puncticollis* or *H. ruficollis*.

***H. ruficollis*, Sturm.** Elongate, dark reddish-brown, head and thorax often lighter red; thorax longer and narrower than in the succeeding species, with the sides rounded in front, but more obliquely and gradually narrowed behind, with posterior angles hardly right angles, and almost blunted; elytra narrower and more elongate, pitchy, with the interstices more coarsely punctured than in any of the allied species; the female has the hinder edge of the last abdominal segment raised in the middle in a small tubercle, according to M. Bedel, but this character is not very evident. L. 6-8 mm.

Chalky and sandy places, not common, although occasionally rather plentiful where it occurs; Deal, Dover, Sheerness, Box Hill, Reigate, Southend, Hythe; Shipley, near Horsham (common); Malvern; Burton-on-Trent; Hunstanton; Walton-on-Naze; Bournemouth; Swannage; Isle of Wight.

H. puncticollis, Payk. Very like the preceding, but rather shorter and broader in form, colour similar, thorax extremely variable in shape, sometimes longer and more convex with sides strongly rounded in front and much contracted behind, with posterior angles very prominent (giving the insect somewhat the appearance of *H. cordatus*), at other times shorter with the sides less rounded and more obliquely contracted, with the posterior angles almost blunt; the interstices of the elytra are evidently less strongly punctured than in *H. ruficola*, although more so than in *H. cordatus*, from which latter insect it may also be distinguished by the fact that the striae are always impunctate; the female has the apex of the last abdominal segment simple; the base of the thorax is sometimes bordered and sometimes presents no trace of a border, so that M. Bedel's distinction, depending on this character, is unreliable. L. 6-8 mm.

Widely distributed and in many places common throughout England; Scotland, rare, Lowlands. Ireland, near Dublin and Belfast, and probably common. I once took it on flower-heads that had gone to seed at Filey, Yorks. M. Bedel says that it occurs on the umbels of *Daucus carota*.

H. rufibarbis, F. (*brevicollis*, Serv., *cribellum*, Steph.). Very closely resembles the preceding; the thorax however is, as a rule, much shorter and broader than average specimens of *H. puncticollis*, and has the sides more rounded in front, and so, apparently, more strongly contracted behind; the interstices of the elytra are finely and not quite so thickly punctured as in that species, and the whole form is rather shorter and broader. L. 6-8 mm.

A widely distributed and sometimes abundant species in England; Scotland, apparently very rare; Dr. Sharp has a specimen in his collection from Thornhill, near Dumfries; not recorded from Ireland. I once took it very abundantly at Repton; in a space about a foot square I found between 100 and 200 examples near and upon an old decayed fir-stump: these specimens did not differ much among themselves.

H. parallelus, Dej. Very like *H. puncticollis* in form, but much smaller and more parallel, with thorax about equal in length proportionally to that of ordinary specimens of *H. rufibarbis*; the posterior angles of the thorax are right angles and not produced; the elytra are furnished with larger punctures or pores on the third, fifth, and seventh interstices, and the general colour is darker than the allied species, especially on the underside. L. 5-5½ mm.

Rare; first taken by H. Squire on the Sussex coast; Rochester; Strood; Sheerness; Eastbourne; Dover; Sandown, Isle of Wight.

M. Bedel (l. c. p. 172) considers this species to be synonymous with *H. puncticollis*; in some ways, however, it seems more closely related to *H. rufibarbis*; the fact is, that it is almost impossible to separate these two latter species, and the distinctions that separate *H. parallelus* from them are so small when they come to be tested, that it seems almost impossible to retain it as a good species; neither the small size,

nor the shape of the thorax or of its posterior angles can be depended upon, and the other species, occasionally at any rate, have larger punctures in the interstices. Dr. Sharp, in his collection, has not attempted to assign his numerous specimens to either of the species, but has series numbered from 1 to 7 containing varieties that lead gradually from near *cordatus* to the most extreme *rufibarbis*; there are one or two intermediate specimens which it would be perfectly impossible to assign to either species. It seems extremely probable that *H. rufibarbis*, *H. puncticollis*, and *H. parallelus* will eventually be regarded as one variable species. (For notes on the doubtful species of *Ophonus*, &c., see Ent. Mo. Mag. xxii. 172.)

(Sub-Gen. ii. **Pseudophonus**, Mots.)

- | | |
|---|---------------------------|
| I. Posterior angles of thorax sharp and projecting; episterna of metathorax punctured | H. RUFICORNIS , F. |
| II. Posterior angles of thorax blunt; episterna of metathorax smooth | H. GRISEUS , Panz. |

H. ruficornis, F. Oblong, head and thorax black, somewhat shining, the latter thickly punctured at sides, disc almost smooth, posterior angles sharp, projecting, somewhat acute; elytra very dull, covered with fine close punctuation between striae, clothed entirely with a fine short greyish-golden pubescence; legs red. L. 12-15 mm.

Common and generally distributed throughout the kingdom as far north as the Moray district; it does not, however, appear to occur in the extreme north of Scotland as far as is known at present.

H. griseus, Panz. Very like the preceding, of which it has often been considered a variety, but the formation of the thorax renders it quite distinct: it is much smaller than *H. ruficornis*; the sides of the thorax are straighter and more parallel, less rounded in front, and less contracted behind, and the posterior angles are very blunt and almost rounded; in nearly all other respects it closely resembles the above species. L. 10 mm.

This species was first observed as British by Mr. Waterhouse (Ent. Ann. 1863, 68), but he did not know the locality of his specimens; it has been taken on Cannock Chase and, I believe, in the New Forest, and also in Ireland.

(Sub-Gen. iii. **Harpalus**, i. sp.)

- | | |
|---|------------------------------|
| I. External interstices of elytra entirely punctured. | |
| i. Colour very variable, metallic; legs almost always red; apex of elytra strongly emarginate, especially in male; length $8\frac{1}{2}$ - $10\frac{1}{2}$ mm. | H. EXETS , F. |
| ii. Colour black, not metallic; legs black, tarsi red; apex of elytra slightly sinuate; length 11-14 mm. | H. CALCEATUS , Sturm. |
| II. External interstices of elytra smooth (except for the large regular punctures or pores on the margin, and also at apex in some species); apical margin of elytra simply more or less sinuate. | |

- i. Metathoracic episterna narrow and elongate; colour black or bluish black.
 - 1. Length 7-8 mm.; basal depressions of thorax very strong, space between almost smooth . . . H. CONSENTANEUS, *Dej.*
 - 2. Length 10-11 mm.; basal depressions of thorax shallow, the whole base more or less punctured . . . H. TENEBROSUS, *Dej.*
- ii. Metathoracic episterna broad and not elongate.
 - 1. Base of thorax densely punctured or rugose throughout.
 - A. Apex of seventh interstice of elytra with a row of 5-9 pores H. RUBRIPES, *Duft.*
 - B. Apex of seventh interstice of elytra without pores.
 - a. Upper side metallic green or bronze (often dull, almost black, in female).
 - a*. Posterior angles right angles; length 9 mm. H. DISCOIDEUS, *F.*
 - b*. Posterior angles blunt; length 12 mm. H. CUPREUS, *Dej.*
 - b. Upper side black, base of thorax lighter or darker blue H. CASPIUS, *Stev.*
 - c. Upper side black in both sexes.
 - a*. Thorax with extreme margins light; elytra without large punctures or pores on third interstice H. LATUS, *L.*
 - b*. Thorax entirely black; elytra with two or three pores on third interstice . . . H. QUADRIPUNCTATUS, *Dej.*
 - 2. Base of thorax smooth or almost smooth, with basal depressions very shallow, sometimes hardly indicated, sometimes obscurely rugose and punctured.
 - A. Apex of 8th interstice of elytra with a series of pores; elytra produced at apex . . . H. MELANCHOLICUS, *Dej.*
 - B. Apex of 8th interstice of elytra without a series of pores; elytra not produced at apex.
 - a. Thorax not contracted from middle to base.
 - a*. Form rather depressed; elytra behind middle not or hardly broader than base of thorax.
 - a†. Legs black with tarsi red; thorax nearly as broad in front as behind . . . H. TARDUS, *Panz.*
 - b†. Tibiæ, tarsi, and femora unicolorous; thorax much narrower in front than behind.
 - a‡. Colour dark brown red or pitchy, margins of thorax broadly reddish; antennæ and legs red H. SERVUS, *Duft.*
 - b‡. Colour black; antennæ pitchy with lighter base, legs black . . . H. ANXIUS, *Duft.*
 - b*. Form very convex; elytra behind middle much broader than base of thorax H. SERRIPES, *Schön.*
 - b. Thorax feebly but perceptibly contracted from middle to base; colour very variable, sometimes black, sometimes bright blue or greenish, metallic H. IGNAVUS, *Duft.*

- c. Thorax distinctly contracted at base, posterior angles either very blunt or rounded.
- a*. Elytra with pore on posterior third of third interstice; upper side, legs, and antennæ black; length 7 mm. . . . *H. NEGLECTUS*, Dej.
- b*. Elytra without pore on posterior third of third interstice; upper side pitchy red, legs and antennæ light red; length 4 mm. *H. PICITENNIS*, Duft.

H. æneus, F. (*Proteus*, Payk.). Very variable in colour, brassy, coppery, bright green, purple, sometimes almost crimson, blue-black, or black, thorax and elytra not always unicolorous; antennæ red with middle joints occasionally darker; thorax subquadrate, anterior and posterior margins about equal in breadth, posterior angles blunt right angles, base very finely punctured with a shallow depression on each side; elytra with sides almost straight, external interstices finely punctured; apex very broadly and strongly excised in male, very strongly sinuate in female; legs red, occasionally pitchy black. L. $8\frac{1}{2}$ – $10\frac{1}{2}$ mm.

One of the commonest of our species; abundant throughout the kingdom; it varies very considerably in size as well as in colour, small specimens occasionally occurring which are not much larger than *H. azureus*; it can always be separated from the allied species by the formation of the apex of the elytra; the female is somewhat duller than the male, but the difference is not, as a rule, so marked in this species as in others of the genus; the legs are occasionally dark.

H. calceatus, Sturm. Black, or pitchy black, underside sometimes pitchy brown; antennæ and palpi clear red; thorax much broader than long, with sides feebly rounded in front and very slightly contracted, almost straight, towards base, posterior angles right angles; the entire base is coarsely and rugosely punctured, and is depressed on each side, but with no evident basal foveæ; elytra rather long, broader in front than base of thorax, with deep impunctate striae, interstices somewhat convex, the space between the eighth stria and the margin densely and finely punctured, besides the usual marginal row of large pores; metasternum rather strongly punctured; legs black or pitchy black, tarsi clear red. L. 11–14 mm.

Very rare; lately (Jan. 1886) reinserted in the British list on a specimen taken by myself at Bridlington, Yorks, in 1879, and mistaken for *H. tenebrosus*, of which I did not possess a specimen: on Mr. Champion presenting me with a pair, I at once saw that my insect belonged to quite a different species; a single specimen is said to have been taken in 1830 near Swansea by Rev. C. Kuper; in France it is common, and flies to light. M. Bedel considers that the species belongs to the sub-genus *Pseudophonus*, its tarsi being somewhat pubescent, and not glabrous, but the fact that the outer interstices only are punctured, and that all the others are impunctate, seems to show that, although its position may be doubtful, it is better to place it among the true Harpali, in which case its natural position seems to be near *H. æneus*. (See Ent. Mo. Mag. xxii. 172.)

H. consentaneus, Dej. (*attenuatus*, Steph.). Oblong, rather narrow, almost parallel; male shining black, female dull black; antennæ

and palpi red; thorax rather convex, with sides rounded in front, and very slightly contracted behind, posterior angles sharp and prominent right angles, extreme lateral margins often reddish; at the base are two deep and strongly punctured depressions, the space between which is almost smooth; elytra slightly broader than thorax, deeply striated; femora black, tibiae and tarsi red. L. 7-9 mm.

Sandy places, under moss, stones, &c. Local, but often found in abundance on the coast, rare inland. Shicrness; Deal; Folkestone; Woking; Eastbourne; Hunstanton; Isle of Wight; Isle of Man; Wallasey, near Liverpool; Devonshire; North Wales.

H. tenebrosus, Dej. (*Wollastoni*, Daws.). Oblong, black, or black with a very slight steel-blue tinge on the elytra; antennae red, middle joints darker at base; thorax about one-third broader than long, widest a little before the middle, slightly narrowed in front and behind, posterior angles obtuse, blunt; at the base on each side there is a shallow depression, more or less strongly punctured; the remainder of the base is sometimes punctured throughout, or the intermediate space between the depressions is almost smooth; elytra at base somewhat broader than base of thorax, with rather strong impunctate striae, apex sinuate and strongly produced; femora and tibiae pitchy black, tarsi red. The female is duller than the male, and apparently has the base of the thorax less punctured.

Very rare; Brighton; Battersea Fields (Rye, one example); Whitsand Bay, near Plymouth (common 1875-76, J. J. Walker, who could not however find it in 1885); Margate (Spiers); Ramsgate (Gorham); Eastbourne (A. C. Horner); Slapton Ley (Wollaston); Isle of Wight (W. G. Blatch); Swansea (W. G. Blatch); Northumberland and Durham (very rare, Bold).

H. rubripes, Duft. Oblong oval, rather broad, convex; colour variable, male brilliant green, purple, or bluish, female obscure dull green, sometimes almost black; antennae and palpi red; thorax transverse, slightly narrowed in front, very slightly contracted behind, posterior angles blunt right angles, central furrow very strongly marked, base with two shallow depressions, which together with the base itself are punctured (more closely in female, however, than in male); elytra rather short and convex with impunctate striae; apex of seventh interstice with a row of from seven to nine pores; legs red. L. 9-10 mm.

Sandy, chalky, and gravelly places, under stones, &c.; local; in abundance at Sandown, Isle of Wight, and other places in the south of England, and the London district generally; also occurs in the Midlands; rare further north, Whitby, &c.; Scotland, rare Lowlands; Ireland, near Belfast.

The male of this species closely resembles *H. aeneus*, but may easily be distinguished by the very slight sinuation of the apex of the elytra.

H. discoideus, F. (*smaragdinus*, Duft.). Oblong, male shining brassy green or bluish, female dull pitchy black, margins of thorax (and more imperceptibly of elytra) edged with red; antennae and palpi testaceous red; thorax much broader than long, scarcely narrowed behind,

posterior angles right angles, base with a rather broad rugose depression on each side, the base and depressions being thickly punctured; elytra with impunctate striæ, very slightly sinuate at apex; legs red. L. 9-10 mm.

Very rare; sandy districts, at the roots of heath and under stones; Chobham (Champion); Gravesend; Brandon, Suffolk (J. J. Walker); Goshalt; Woburn, Beds; recorded by Dawson from Sandy, Bedfordshire, and Isle of Wight.

H. cupreus, Dej. Oblong, rather broad, considerably larger than the preceding; colour metallic green, more or less bronzed, sometimes coppery, not very shining; antennæ pitchy with basal joint and sometimes part of more or less of the other joints light red; thorax subquadrate, slightly narrowed in front, scarcely contracted behind, posterior angles blunt, with two depressions at base, which with the base itself are thickly punctured; elytra deeply striated, with the usually short sutural striæ longer than in any other of our species, apex with hardly a trace of sinuation; legs pitchy black, claws red. L. 12-13 mm.

Very rare; Ryde, Cowes, and Sandown in the Isle of Wight. Mr. Horner took it not long ago at the latter place. Stephens gives the banks of the Thames below Gravesend as a locality, but this may have been in error.

I have a specimen of this insect from Greece (sent by Reitter) which is larger and more convex than our British specimens, and has the legs and antennæ clear red.

H. caspius, Stev. (*depressus*, Duft., *dimidiatus*, Rossi). Oblong ovate, shining black with the base of the thorax (and sometimes its entire surface) greenish blue or violaceous, antennæ fuscous, base light red; thorax subquadrate, rather convex, sides slightly rounded in front and behind, posterior angles very blunt, almost rounded off, base with two shallow depressions, which with the base itself are thickly and somewhat rugosely punctured; elytra at base hardly as broad as base of thorax, with strong impunctate striæ (occasionally feebly punctured in female), slightly sinuate at apex; fifth and seventh interstices with several pores at apex; legs black, claws red. L. 12-13 mm.

Local, but not uncommon in the south; on chalky hill-sides and in salt marshes, under stones, &c. Whitstable, Gravesend, Sheerness, Dover, Reigate, Box Hill; Isle of Wight, Ventnor, Bonchurch, &c.; Bournemouth; Weymouth; Portland. Apparently confined to the southern and south-eastern districts of England.

H. latus, L. Oblong, shining black, with the extreme margins of the thorax reddish testaceous; antennæ and palpi red; thorax almost quadrate, slightly narrowed in front, not narrowed behind, posterior angles blunt right angles, with two shallow depressions at base, which with the base are closely and somewhat rugosely punctured; elytra strongly striated with scarcely a trace of sinuation at apex; legs red. L. 8-9 mm.

Generally distributed and common throughout England; Scotland, common Lowlands; Ireland, common near Dublin, and probably generally distributed. Mr. Lewis

captured a variety of this species at Folkestone, with metallic instead of black elytra, which Rye introduced as *v. metallescens*. (Ent. Mo. Mag. xi. 84.)

H. quadripunctatus, Dej. Very like the preceding, but distinguished by being rather larger and more parallel with a slight steel-blue reflection; the thorax is not furnished with the testaceous edge so evident in *H. latus*; on the apical half of the third interstice of each elytron are two or three large pores, which are wanting in that species. L. 9–10 mm.

A very local northern species, chiefly confined to the Highlands of Scotland; Braemar, Aviemore, &c.; Newcastle; recorded by Mr. W. G. Blatch from Cheddar; it has also occurred in Ireland.

H. melancholicus, Dej. Male shining black, female duller; antennæ red, intermediate joints sometimes dusky; thorax subquadrate, a little narrowed in front, with sides quite straight behind, posterior angles almost right angles, but blunt and slightly obtuse, disc much wrinkled, base depressed with a fovea on each side, sometimes almost smooth, sometimes with coarse scattered punctures; elytra rather parallel, with distinct striæ, eighth interstice from the suture with a row of pores at apex, apex considerably produced; legs pitchy, tarsi lighter. L. 10–11 mm.

Rare. Swansea; Tenby; North Wales, Conway, &c.; Deal; Plumstead, Kent. In Mr. Champion's collection is a very small variety about 8 mm. long, taken by Mr. J. J. Walker in 1885 in the Isle of Portland, Dorset.

H. tardus, Panz. (*Fröhlichi*, Sturm). Male shining black; female duller; antennæ and palpi clear red; thorax broad, subquadrate, slightly narrowed in front, with sides straight behind, posterior angles rather blunt, but almost right angles, base with an almost obsolete depression on each side, somewhat punctured in male, almost entirely smooth in female; elytra with very feebly-punctured striæ; femora and tibiæ pitchy black, apex of latter and tarsi red. L. 9–10 mm.

Sandy places under stones, &c.; common throughout England on the coast and inland; Scotland, rare, Aviemore, Glasgow, &c.; Ireland.

Resembles *H. melancholicus*, but may at once be distinguished by not having the apex of the elytra produced, and by the absence of pores at the apex of the eighth interstice of elytra.

H. servus, Duft. Oval, rather flat, reddish brown or pitchy, with the sides of thorax, especially at posterior angles, broadly red; antennæ red; thorax broadest at base, gradually rounded and narrowed from base to apex, posterior margin emarginate from angle to angle in an arc of a circle, thus rendering the posterior angles bluntly pointed, base with two depressions, smooth; elytra finely striated, very feebly sinuate at apex; legs black, apex of tibiæ, and tarsi, reddish brown. L. 8–9 mm.

Sandy places, on or near the coast, rare; Deal; Romney Sands and Covert Wood (Tylden); Sandwich; Southend; Hastings; Folkestone; Portsmouth; Yarmouth; Hunstanton.

H. anxius, Duft. Closely resembles the preceding, but is smaller, and longer oval, black, with the antennæ lighter or darker brown, base red; thorax usually as in *H. serrus*, but occasionally the hind margin is straight or almost straight, and so the posterior angles are simply blunted; elytra almost parallel-sided, finely striated; legs black, extreme apex of tibiæ, as a rule, and claws, reddish. L. 7-8 mm.

Sandy coasts; abundant in the south; apparently not found in the north.

H. serripes, Schön. (*stygius* Steph., *converus*, Fairm.). Black, very convex, male shining, female duller, but not so much so as in other allied species; antennæ with basal joint bright red, the two or three following dusky at base, the rest dull ferruginous; thorax narrowed in front, very gradually and imperceptibly contracted from about middle to base, posterior angles obtuse, base with an obsolete depression on each side, almost smooth; elytra narrowed in front, widened behind, wider behind middle than base of thorax, with strong striæ, the third interstice with a pore behind close to the second stria; legs pitchy black. L. 9-11 mm.

Sandy coasts; not uncommon in the south; Deal; Sheerness; Margate; Weymouth; Portland; Isle of Wight; also Wallasey, near Liverpool.

H. ignavus, Duft. (*honestus*, Duft., *rufitarsis*, Duft.). Colour variable, blue, blue-black or black (foreign specimens are sometimes bright green or bronze); antennæ red, intermediate joints sometimes dusky; thorax feebly rounded at sides, gradually contracted from middle to base, with posterior angles nearly right angles, base with a depression on each side; elytra very strongly striated, slightly but plainly sinuate at apex; legs pitch-black, tarsi lighter. L. 8-9 mm.

The coloured varieties of this species are the *Carabus honestus*, Duft. This species M. Bedel retains as distinct from *ignavus*, on the ground of its colour, and the fact that the sutural angle of the elytra in female is produced "en forme d'épine" and not "simplement aigu" as in the type species; there appears, however, to be no real structural difference.

Sandy places; common in the London district; Hythe; Bournemouth; Southampton; Isle of Wight; Bristol. Ireland, Portmarnock. Not recorded from the north of England or Scotland.

H. neglectus, Dej. Ovale, shining black; antennæ with first joint red, apex dull red, the rest black or pitchy; thorax short, sides rounded in front and behind, strongly contracted to base, posterior angles rounded but visible, base with a deep depression on each side; elytra ovate, rather convex, third interstice with a pore close to the second stria; legs pitchy black, tarsi red. L. 7-8 mm.

This species is about the size of *H. anxius*, and is often confounded with it, but the rounded sides and posterior angles of thorax at once distinguish it.

Sandy coasts, local, but not uncommon; Chesil Bank (abundant); Weymouth; Bournemouth; Swansea; Barmouth; Rhyl; Wallasey.

H. picipennis, Duft. (*vernalis*, F.). The smallest species of the genus that we possess; ovate, pitchy, antennæ red; thorax transverse, narrowed in front and behind, with posterior angles rounded, base with an oblong depression on each side, wholly impunctate; elytra with fine striae, without pore on third interstee; legs red. L. 4-6 mm.

Not common; on sandy coasts; Chesil Bank; Exmouth; Weymouth; recorded by Dawson from the coasts of Norfolk, Suffolk, and Essex.

Besides the above species, *H. luteicornis*, Duft., and *H. sulphuripes*, Germ., have been included in the British list; the specimens, however, appear to have been erroneously determined, and to have belonged to other allied indigenous species: *H. luteicornis* is closely allied to *H. latus*, but is smaller, with the posterior angles of the thorax sharp right angles and not blunt as in that species, and the base more weakly punctured; the antennæ and legs are also lighter; *H. sulphuripes* comes very near to *H. ignavus* v. *honestus*, but is considerably smaller, with the sides of the thorax more strongly contracted behind, and the apex of the elytra more sinuate; it differs also by the fact that the tibiae and tarsi are entirely red, only the femora being dark: for specimens of these species I am indebted to the kindness of Herr Reiter.

ANISODACTYLINA.

The Anisodactylina are characterized by having the dilated joints of the anterior tarsi of the males furnished beneath with a thick brush-like clothing of short erect hairs, or, as some authors term it, "spongy pubescent;" several of the genera are somewhat intermediate between the Harpalina and Anisodactylina, for instance *Dichiotrichus*, which by some writers is classed under *Bradycellus*; *Diachromus* also is sometimes included under the Harpalina, but seems decidedly to belong to the Anisodactylina; *Dichiotrichus*, however, has the soles of the dilated joints partly squamose and partly pubescent; as in some of the Patelliniani, some of the hairs are dilated at their apices, and show a tendency to assume a scale form; on the whole, however, it appears best to class it with the Anisodactylina. The curious genus *Gynandromorphus*, which Dr. Horn would suppress as belonging to *Anisodactylus* proper, seems abundantly distinct through the strongly dilated first joint of the tarsi of the female.

- I. Anterior tibiae armed with one apical spine only (simple or tricuspid).
 - i. First joint of anterior tarsi of male as broad as the following joints.
 1. Intermediate tarsi not dilated in male *DICHIOTRICHUS*, Duft.
 2. Intermediate tarsi dilated in male *SCYBALICUS*, Schaum.
 - ii. First joint of anterior tarsi of male conspicuously narrower than the following joints *ANISODACTYLUS*, Dej.
- II. Anterior tibiae armed with two apical spines, the one large, the other small *DIACHROMUS*, Er.

DICHIROTRICHUS, Duval.

About ten species are contained in this genus, which are widely distributed throughout Europe, one only occurring as far south as the Canary Islands; our two species may be separated as follows:—

- I. Interstices of elytra broad with three rows of irregular punctures on each; striae weak, almost impunctate . . . *D. OBSOLETUS*, Dej.
- II. Interstices of elytra narrow with one or two rows of irregular punctures on each; striae strong *D. PUBESCENS*, Payk.

The larva of *D. pubescens* is described by Schiödte (iii. 259, Pl. xxii., Fig. 19) as belonging to the genus *Bradyellus*; it very closely resembles that of *Stenolophus*, but is somewhat broader with the head rather larger, and the anal appendage very short and stout; the maxilla, especially the stipites, are much larger, and the dorsal abdominal scuta are smaller; the colour is white with the legs, cerci, and dorsal scuta pale ferruginous, with darker markings on head and segments of thorax; the prothorax is transverse with all its angles obtuse, slightly convex, with the sides sharply and narrowly margined: the larva is found in salt marshes with the perfect insect.

D. obsoletus, Dej. Always of a light testaceous colour, with a dusky streak on each elytron, head sometimes dark; thorax about as long as broad with sides slightly rounded in front and narrowed behind, with a very strong oblong depression on each side at base; elytra broad with fine striae which are almost impunctate, interstices with three irregular rows of punctures on each; legs light testaceous. L. 7 mm.

Locally abundant; salt marshes beneath stones, clods of earth, &c.; Lympington Salterns, Whitstable, Sheerness, and other places on the south and south-east coasts, but not occurring further north.

D. pubescens, Payk. Very like the preceding, but smaller and narrower, and, as a rule, much darker in colour, being sometimes entirely pitchy; the thorax is more cordiform and the punctures on its disc are larger and more diffuse; the elytra are narrower in proportion to thorax with strong and strongly punctured striae, interstices with one or two irregular rows of punctures on each. L. 6 mm.

Salt marshes and banks of tidal rivers: very common in England; Scotland rather widely distributed but local; Ireland, near Dublin and Belfast, and probably common.

SCYBALICUS, Schaum.

This small genus was formed by Schaum to include one or two insects that were formerly included under *Harpalus*, but which were evidently quite distinct in several particulars; he first named the genus *Aptotelus*, but afterwards gave it its present name.

S. oblongiusculus, Dej. About the size and build of *H. rotundicollis*, but rather narrower; dark pitchy red; antennae and palpi ferruginous; head strongly punctured; thorax with sides rounded in front, strongly contracted behind, posterior angles rounded, with distinct central furrow ending in a depression in front and behind, strongly punctured through-

out, strongly depressed and more closely punctured behind; elytra rather flat, somewhat parallel-sided, with rather strong striae, interstices closely punctured, the surface entirely clothed with thick yellowish pubescence (as in *H. ruficornis*); legs ferruginous. L. 11–13 mm.

This fine addition to our fauna is due to Mr. J. T. Harris, who took a single specimen near Portland in 1878; in 1879 Mr. P. B. Mason took about twenty specimens in the same locality under stones; three specimens only have occurred there since, two taken by Mr. J. J. Walker, one soon after Mr. Mason took his specimens, and another in the autumn of 1885, and one by Rev. O. P. Cambridge; these later captures prove that it is still in the neighbourhood, and was not a chance importation, but it seems strange that so large and conspicuous an insect for so long escaped detection.

ANISODACTYLUS, Dejean.

This genus contains about seventy-five species, which are very widely distributed over the surface of the globe; it is curious, however, that only seven of these occur in Europe (of which three belong to the subgenus *Dichirus*, Mann.), while in Crotch's "Check List of the Coleoptera of North America" no fewer than forty-five species are enumerated; on the other hand, the European species of *Harpalus* are double the number of those found in North America. In general appearance the Anisodactyli closely resemble the Harpali; they are usually found in damp localities under stones and clods of earth.

I. Posterior angles of thorax prominent; colour black . . . **A. BINOTATUS, F.**

II. Posterior angles of thorax rounded; colour metallic,
variable **A. PÆCILOIDES, Steph.**

A. binotatus, F. Black, somewhat shining; antennæ pitchy, first and sometimes part of second joint red; head with two red spots on the forehead between eyes, often confluent, sometimes obsolete; thorax transverse, feebly rounded at sides, contracted gradually towards base, posterior angles produced at their extreme apex into a small sharp tooth, disc somewhat obscurely wrinkled longitudinally, base strongly and closely punctured throughout, with a broad shallow depression on each side; elytra somewhat parallel-sided, disc strongly striated, distinctly sinuate at apex; legs black, tarsi reddish. L. 10–12 mm.

Rather widely distributed and common in the south of England, rarer in the north; Scotland, local, Lowlands.

V. spurraticornis, Dej. Resembles the preceding, but has the legs entirely red: occurs with the type.

V. atricornis, Steph. (*Harpalus atricornis*, Steph., Daws.). This variety is so very much smaller than the type, and looks so different, that it is almost impossible to regard it as anything but a distinct species: on closer examination, however, there does not appear to be any one point on which it can be separated; in size and general appearance it very closely resembles *Harpalus tardus*. L. 8 mm.

Sandy places, rare, and found unassociated with the type form; Bournemouth

(Sharp); Woking (Power); Chobham (Saunders and Champion); Reigate; Wimbledon. Stephens gives as localities "near London, Windsor, and in Glamorganshire."

A. pœciloides, Steph. (sub-gen. *Dichirus*, Mann.). Colour variable, brassy green or coppery, sometimes brilliant green, occasionally with a bluish or reddish tinge; antennæ pitchy, basal joint red underneath; head with a red spot (often obsolete) between eyes; thorax with sides rounded, widest in middle, posterior angles rounded, base with a large punctured fovea on each side; elytra deeply striated, sinuate at apex, interstices convex, legs black, claws red. L. 9–11 mm.

Local, salt marshes, under stones, &c. Deal, Dover, Sheerness, Gravesend, Sheppy; Lymington Salterns and Christchurch; Isle of Wight; Weymouth; Walton-on-Naze: apparently not found in the north, or in Scotland.

DIACHROMUS, Erichson.

One species only belongs to this genus, which is common over the whole of central and the greater part of southern Europe, but is doubtfully indigenous as British.

D. germanus, Er. Head testaceous red very finely punctured, antennæ red; thorax bluish or greenish with testaceous margins, with sides dilated and rounded behind anterior angles, contracted behind, posterior angles somewhat acute, the entire surface very closely punctured; elytra ovate, testaceous red, with a bluish or greenish patch at apex, finely striated, interstices thickly and finely punctured; underside shining black except of head, which is testaceous; legs reddish testaceous. L. $7\frac{1}{2}$ – $8\frac{1}{2}$ mm.

Very rare; a few specimens have been taken running on the pathways at St. Leonards, Deal, Hastings, &c., by Mr. F. Smith, Mr. S. Stevens, Mr. E. Saunders, and others. Dr. Leach recorded it from Kingsbridge in Devonshire: in its usual localities it appears to be found under stones or on the stems of grasses, &c., in marshy places.

Sub-Div. iv. **Tripalmati.**

The members of this division are distinguished by the fact that the males have the first three joints of the anterior tarsi dilated (cordiform or emarginate), and clothed underneath with squamæ.

The tribes may be distinguished as follows:—

- I. Head with one supra-orbital setigerous puncture ZABRINA.
- II. Head with two supra-orbital setigerous punctures.
 - i. Epipleuræ of elytra with the edges interrupted at the level of the last abdominal segment.
 - 1. Terminal joint of the labial palpi as long as, or longer than the penultimate, the latter bisetose in front PTEROSTICHINA.
 - 2. Terminal joint of the labial palpi shorter than the penultimate, the latter plurisetose in front AMARINA.
 - ii. Epipleuræ of elytra continuous to apex, edges not interrupted ANCHOMENINA.

ZABRINA.

The genus *Zabrus* is placed by Schaum, Lacordaire, and other authors in the *Pterostichina*; it is, however, an intermediate genus, and is best regarded as forming a separate tribe between the *Harpalina* and the *Pterostichina*; it possesses, as Dr. Horn remarks, strongly marked characters of each of these tribes, but is abundantly distinct from either by the structure of the anterior tibiæ; the head and thorax are akin to those of the *Harpali*, while the elytra and anterior tarsi belong rather to *Pterostichus*.

ZABRUS, Clairville.

This genus comprises a considerable number of species which are chiefly found in the Europeo-Mediterranean countries, including Asia Minor, Syria, and the district reaching to the Caspian Sea. The *Zabri* are said both in their larval and perfect state to do considerable damage to grain crops. The larva is figured by Westwood (*Classif. i.* 67, Fig. 2, 6), and by Sturm (*Insect. Deutsch.*, Pl. xcvi.iii.): it is of the ordinary type, long and flattened, with the segments of nearly equal breadth except towards the apex of abdomen, where they become narrower; the body is said to be of a more fleshy consistence than usual; the cerci are rather short, and the muscular impressions of the scuta well marked; according to Germar these larvæ bury themselves in the earth during the day-time several inches deep, and come out to feed at night; they remain in the larval state for about three years, and then form for themselves an oval cavity in the earth, sometimes two feet deep, whence they emerge in the perfect state in about a month. The perfect insects do considerable damage by climbing up the corn-stalks and opening the husks of the grains, and devouring the interior; it would appear, however, that they are in part carnivorous, and not entirely vegetable feeders. Several of the *Harpali* and *Amare* seem to resemble them in their habit of feeding on the seeds of plants, the pith and stems of grasses, &c.

Z. gibbus, F. (*piger*, Fourc., *tenebrioides*, Goeze). Convex, deep black, occasionally with a feeble metallic tinge; antennæ and palpi ferruginous; thorax transverse, slightly narrowed in front, sides almost straight behind, posterior angles blunt right angles, base rather broader than extreme base of elytra, coarsely and strongly punctured in front and behind, disc much wrinkled; elytra broad, parallel, with strong punctured striæ; femora black, tibiæ and tarsi reddish. L. 14–16 mm.

Very local, but occasionally common; corn-fields, &c., under stones, and on grass and corn-stems at dusk; Sheerness (abundant at times), Chatham, Walmer, Croydon, Richmond, Sandown (Isle of Wight), Hythe, Brighton, Dover, Worthing, Colechester, Overton (Hants), &c.; also recorded by Stephens from Cambridge.

PTEROSTICHINA.

This tribe, as here characterized, contains our three genera, *Stomis*,

Pterostichus, and *Platyderus*; Schaum includes the *Anchomenina*, *Amarina*, and also *Patrobis*, *Pogonus*, &c., thus forming so unwieldy a tribe that it is totally incapable of any reasonable definition. The tribe, as here laid down, is separated from the *Zabrina* by the fact that the head has two supra-orbital setigerous punctures instead of one, from the *Amarina* by having the terminal joint of the labial palpi as long as or longer than the preceding, which is bisetose in front, instead of being shorter and plurisetose, and from the *Anchomenina* by having the epipleuræ interrupted at the level of the last abdominal segment, instead of being continuous to apex.

- | | |
|--|---------------------------|
| I. Mandibles long and prominent, more than half the length of the head; maxillæ not hooked at the tip | STOMIS, <i>Clairv.</i> |
| II. Mandibles not prominent, shorter than half the length of the head; maxillæ hooked at the tip. | |
| i. Tooth of mentum simple; thorax with anterior margin produced in front, bisinuate | PLATYDERUS, <i>Steph.</i> |
| ii. Tooth of mentum emarginate; thorax with anterior margin not produced in front, straight or almost straight | PTEROSTICHUS, <i>Ec.</i> |

STOMIS, Clairville.

This genus contains only four species, three of which are European: they are chiefly remarkable for the size of their mandibles.

S. pumicatus, Panz. Elongate, pitchy black, shining; head narrow, palpi and antennæ red; thorax elongate, strongly rounded behind anterior angles, very much contracted behind, posterior angles acute and prominent, disc convex, central furrow well marked, base with an oblong fovea on each side; elytra rather long, ovate, with nine strongly punctured, almost crenulate stria; legs red. L. 6-8 mm.

Under stones, flood refuse, &c.; not uncommon in England and Ireland, although never taken in any one place in abundance. Scotland, not common, Lowlands.

PLATYDERUS, Stephens.

The species of this genus approach closely to the *Cakathi*; they are about twenty-four in number (about twelve, according to M. Bedel, who considers the number much exaggerated), and inhabit the European-Mediterranean region and the Canary Islands, &c. We possess one species only as British. M. Bedel places the genus between *Sphodrus* and *Cidathus*, and considers that it has nothing to do with *Pterostichus* at all.

P. ruficollis, Marsh. Elongate, flat, pitchy-black or ferruginous; head pitchy very shining, antennæ and palpi lighter or darker red; thorax always more or less rufescent, about as long as broad, anterior angles somewhat prominent, sides curved gradually to base, posterior angles obtuse almost rounded, with a strongly impressed dorsal furrow, and a

strong depression on each side at base; elytra wider than thorax, flat, finely striated, with three distinct pores on third interstice; legs red. L. 6-7 mm.

Sandy and chalky places, under stones, moss, dead leaves, &c.; local, but widely distributed. London district; Margate; Folkestone; Bournemouth; Brighton; Burton, Repton, Lichfield, Derby, Belper and other midland localities; Tonbridge; Cheddar; on the sea coast Northumberland, not rare. Not recorded, apparently, from Scotland or Ireland.

PTEROSTICHUS, Erichson.

This genus, if we include all the sub-genera, is one of the largest, in point of numbers, of the whole family of Carabidæ; the species are widely distributed throughout the globe, but by far the greater majority belong to the temperate and cold regions of the northern hemisphere. In its widest sense it is synonymous with the genus *Feronia*, Latreille.

The larva of *Pterostichus nigrita* is figured by Schiödte (iii., Pl. xix., Fig. 9). It is narrow and linear, somewhat depressed; the prothorax is shining, very finely reticulate, rather broader than long, narrowed in front where it is about as broad as the head; the head and pronotum are dark; the rest of the scuta are pale with a few darker markings; the abdominal segments become narrower behind, and the ninth is furnished with two cerci of ordinary length; the anal appendage is bifurcate at the tip; the setæ of the whole body are rather long, slender, and erect; the legs are short and the claws almost equal: the larva is found commonly in damp places under stones, &c. The larva of *Pt. melanarius* very closely resembles the preceding, but of course is much larger.

The larva of *Abax striola* (figured by Schiödte, vi., Pl. i., Fig. 3) differs considerably from these two: it is much stouter; the colour is entirely pale fuscous, with the mandibles darker; the cerci are much longer and jointed, and the anal appendage is not bifurcate; the mandibles are larger, stronger, and more curved, and the muscular impressions on the scuta are well marked: the larva is found under dead leaves, in moss, rotten stumps, &c.

The genus contains such a large number of widely differing elements that it is almost impossible to divide it satisfactorily; there are within it a considerable number of sub-genera, many of which have been already considered quite distinct; at the same time the whole question is by no means settled, and a careful examination and revision of the whole of the species is required before a final decision can be arrived at; meanwhile, for convenience sake, it seems the best plan to adopt the genera that have been founded as sub-genera, and to found the divisions of the species upon them as follows:—

- I. Elytra with the third interstice furnished with one or more pores; seventh interstice not raised.
 - i. Tarsi without furrow on their dorsal surface.
 1. Elytra with scutellary stria.
 - A. Antennæ with basal joints compressed above; colour bright metallic *PÆCILUS*, Bon.
 - B. Antennæ with basal joints not compressed; colour black.
 - a. Prosternal process not margined at base . . . *PTEROSTICHUS*, Er.
 - b. Prosternal process finely bordered between the anterior coxæ *ADELOSIA*, Steph.

- 2. Elytra without scutellary stria *PEDICUS, Mots.*
- ii. Tarsi with a distinct furrow running along the middle of their dorsal surface; elytra without scutellary stria *LAGARTUS, Chaud.*
- II. Elytra without pores on the third interstice; seventh interstice raised, somewhat costiform at base *ABAX, Bon.*

The sub-genus *Pterostichus* may be further subdivided as follows:—

- I. Metathoracic episterna as broad or almost as broad as long.
 - i. Posterior angles of thorax rounded; elytra with a distinct stria between the series of large pores and side margin *STEROPUS, Meg.*
 - ii. Posterior angles of thorax well marked; elytra without distinct stria between the series of large pores and side margin.
 - 1. Metathoracic episterna a little longer than broad; upper surface lighter or darker bronze; apex of elytra produced *PLATYSMA, Bon.*
 - 2. Metathoracic episterna fully as broad as long; elytra black with iridescent reflection; apex of elytra not produced *PTEROSTICHUS, i. sp.*
- II. Metathoracic episterna distinctly longer than broad.
 - i. Apical joint of palpi cylindrical, truncate; lateral margin of thorax as a rule broad with a distinct channel on its inner side; species larger.
 - 1. Thorax with posterior angles rounded or almost rounded; shoulders of elytra rounded simple . . . *LYPERUS, Chaud.*
 - 2. Thorax with posterior angles very distinct, usually sharp and pointed; shoulders of elytra rounded, furnished with a small tooth *OMASEUS, Ziegl.*
 - ii. Apical joint of palpi long oval, hardly truncate; lateral margin of thorax narrow without channel; species smaller *ARGUTOE, Meg.*

(Sub-Gen. **Pœcilus**, Bonelli.)

- I. Lateral border of thorax explanate at base.
 - i. Head thickly punctured *P. CUPREUS, L.*
 - ii. Head smooth or almost smooth *P. VERSICOLOR, Sturm.*
- II. Lateral border of thorax not explanate.
 - i. Thorax coppery red, elytra green, the former not or scarcely contracted behind *P. DIMIDIATUS, Ol.*
 - ii. Thorax and elytra concolorous, the former distinctly contracted behind *P. LEPIDUS, F.*

P. cupreus, L. Oblong, female more oval, winged; colour very variable, green, brassy, coppery, purplish, or nearly black; antennæ black with two joints at base red; thorax subquadrate narrowed in front, sides moderately rounded, broadly margined, posterior angles not quite right angles, with plain central furrow and two depressions at base, the outer one somewhat obsolete and close to angle; elytra broader than thorax, rather flat, moderately deeply striated, the third interstice with three distinct pores behind; legs black. L. 10-12 mm.

Widely distributed and common in England and Ireland; Scotland, common, Lowlands.

The variety *P. affinis*, Sturm, has the legs entirely red.

P. versicolor, Sturm (*pauciseta*, Thoms., *cærulescens*, L. (?)). Very like the preceding, of which it has by many authors been considered a variety, but it is usually smaller and of a brighter colour, and is distinct by its smooth head, and the fact that the hind tibiae are furnished with about six bristles on their inner side instead of about ten as in *P. cupreus*. L. 10 mm.

Widely distributed and rather common in the middle and south of England and Ireland; in the north of England and in Scotland it is much commoner than the preceding.

P. dimidiatus, Ol. Oblong; head and thorax shining coppery red, elytra brilliant metallic green, sometimes blackish, antennæ black or fuscous brown with the two first joints red underneath; thorax subquadrate, with sides evenly rounded, posterior angles obtuse, with plain dorsal furrow, base rugose with two oblong depressions, the outer one shortest; elytra hardly broader than thorax, with well marked and strongly punctured striae; legs black. L. 13–14 mm.

Rare; it used to be taken abundantly on Hampstead Heath and Wandsworth Common; Wimbledon, Belvedere, Shirley, Barnes, Red Hill, Reigate, Coombe Wood; also recorded from Folkestone; New Forest, near Lyndhurst.

P. lepidus, F. Narrower and more oblong than the preceding species, apterous; colour variable as in *P. cupreus*, but usually coppery, males shining, females dull, antennæ and palpi entirely black; thorax narrower and more quadrate than in *P. dimidiatus*, with sides straighter and more contracted behind, and the basal depressions deeper and stronger; elytra oblong, with moderately strong striae which are almost impunctate; legs wholly black. L. 11–12 mm.

Very local; Dartford, Esher, Charlton, Weybridge, Chobham; Cannock Chase (discovered by Mr. W. G. Blatch, who found it in some numbers); New Forest; Scotland, very local, Lowlands, Tay, Moray, Clyde; Ireland, Waterford. Dawson gives the following as localities: Norfolk, Devon, Hants, Ely, Cambridge, Northampton, Hertford, and Darenth Wood.

(Sub-Gen. **Steropus**, Megerle.)

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| I. Third interstice of elytra with one impression (on posterior third) | S. MADIDUS, F. |
| II. Third interstice of elytra with three or four almost equidistant impressions | S. ÆTHIOPS, Panz. |

P. madidus, F. Shining black, apterous, antennæ black fuscous towards apex; thorax with sides evenly rounded, somewhat narrowed towards base, posterior angles rounded, with distinct dorsal furrow, base with a deep fovea on each side close to angle; elytra ovate, convex, with moderately strong striae which are obsoletely punctured, third interstice

with a deep impressed puncture on posterior third; legs black, often entirely red; last segment of abdomen in male with a deep furrow at apex, and a short raised ridge just before it. L. 14-16 mm.

Common throughout the kingdom.

P. æthiops, Panz. Smaller and shorter than the preceding; thorax more plainly transverse, and less contracted behind middle; elytra shorter and more ovate than in *P. m. elidus*, the striae impunctate, third interstices with three impressed punctures; last segment of abdomen in male with a furrow at apex and a large obtuse tooth just before it. L. 11-12 mm.

A mountain species; plentiful on Snowden and other Welsh mountains; Cheviot Hills; Rothley Lakes, Northumberland; Scotland, local, Highlands.

(Sub-Gen. **Platysma**, Bonelli.)

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|---|----------------------------------|
| I. Prothorax not strongly rounded in front, about as long as broad | P. OBLONGO-PUNCTATUS , F. |
| II. Prothorax strongly rounded in front, distinctly broader than long | P. VITREUS , Dej. |

P. oblongo-punctatus, F. Brassy black, winged, antennae pitch-black, palpi reddish; thorax quadrate, as long as broad, anterior angles prominent, sides rounded from angles to behind middle, thence contracted to posterior angles, which are acute and very prominent, dorsal furrow distinct ending in a depression in front and behind, base with a large punctured fovea on each side; elytra broader than thorax, somewhat flat, with strong striae, with three to six large round impressions on or near the third interstices; femora pitchy black, tibiae and tarsi reddish. L. 10-12 mm.

In woods, under chips, &c.; abundant in the Forest of Dean; Bagley Wood, Oxon; Robins Wood, Repton; Langworth Wood, Lincoln; Northampton; Windsor; Devonshire; Scotland, very local, Highlands, in fir woods, Tay, Dee; also recorded from Ireland.

P. vitreus, Dej. (*orinomus*, Steph.). Very like the preceding, but easily distinguished by its blacker colour, and distinctly transverse thorax, which has the sides more rounded and the posterior angles less projecting; the elytra are less strongly striated, and are less widened behind the middle, being almost parallel-sided for three-quarters of their length. L. 10 mm.

A mountain species; local, but widely distributed; Llangollen and other places in Wales; Yorkshire Moors; Axe Edge, Buxton; Church Stretton; South Shields; Cheviots. Scotland, widely distributed, but not common, from the Tweed to the Orkneys. Ireland, near Dublin, &c.; the Irish specimens are more brassy, and were called by Stephens *Omasus Bulwerii*.

(Sub-Gen. **Pterostichus**, i. sp.)

P. cristatus, Dufour (*parvopunctatus*, Germ.). Black, slightly iridescent, apterous; antennae black with apical joints fuscous; thorax

cordiform, rounded in front contracted behind, posterior angles right angles, with their apex slightly produced and obtuse, disc with a deep central furrow, and a very strong impressed oblong depression on each side, and a smaller one, sometimes obsolete, close to angles; elytra oblong ovate, deeply striated, interstices convex, the third with three impressions; the male has a longitudinally elevated ridge on the last abdominal segment which forms at its apex a small tooth; legs brown-black. L. 14–16 mm.

Very local; the only locality appears to be the Northumberland and Durham district, where it occurs occasionally in numbers near Newcastle, Sunderland, Ravensworth, Long Benton, and other places.

(Sub-Gen. **Lyperus**, Chaudoir. *Lypersomus*, Mots.)

P. aterrimus, Payk. Very deep shining black, winged; antennæ black, apex slightly fuscous; thorax subquadrate, rather broader than long, with sides feebly rounded, very slightly contracted towards base, posterior angles rounded, margins broadly reflexed especially at posterior angles, central furrow very distinct, continued to base, but interrupted in front by a strong semicircular furrow, base depressed with a large punctured fovea on each side near angles; elytra oblong, not much broader than thorax, parallel-sided, with moderately strong striæ near suture, which become very feeble on the sides; the striæ are more or less punctured, and are much weaker in the female than the male; the third interstice has three large round impressions, but the position of these is variable, as one or two of them are often situated in the stria or on the second interstice; legs black. L. 11–12 mm.

Very local, but formerly abundant in Whittlesea Mere; also found in various places in the Cambridgeshire Fens, Horning Fen, Norfolk, &c., “basking in the sun, on the soft mud, at the edge of the turf pits” (Stephens, *Illust.* i. 113). It is also said to have occurred in Ireland, near Cork: it has become exceedingly scarce, and I do not know of any record of its capture for many years past.

(Sub-Gen. **Omaseus**, Ziegler. *Melanis*, Bon. pars)

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| I. Antennæ with joints 4–10 slender, elongate; thorax with sides almost straight from middle to base. Length 18–20 mm. | <i>P. NIGER</i> , Schall. |
| II. Antennæ with joints 4–10 shorter and thicker in comparison; thorax with sides rounded almost to base. | |
| i. Lateral border of thorax widened behind. Length 15–17 mm. | <i>P. VULGARIS</i> , L. |
| ii. Lateral border of thorax not widened behind. Length not exceeding 11 mm. | |
| 1. Apex of elytra at suture furnished with a little tooth (female) or sharply angled (male); anal segment of abdomen in male with a large deep, round or oval, depression | <i>P. ANTHRACINUS</i> , Ill. |
| 2. Apex of elytra at suture bluntly rounded; anal segment of abdomen in male without depression. | |
| A. Abdomen punctured on the sides; anal segment of abdomen in male with a small raised tubercle . . . | <i>P. NIGRITA</i> , F. |

B. Abdomen impunctate.

- a. Length 8 mm.; form wider; anal segment of abdomen in male simple in both sexes *P. GRACILIS*, Dej.
- b. Length 6 mm.; form narrower; anal segment of abdomen in male with a fine raised longitudinal line *P. MINOR*, Gyll.

P. niger, Schall. Oblong, black, rather dull; antennæ with three basal joints black and glabrous, the rest fuscous and pubescent; thorax quadrate, slightly rounded in front and narrowed behind, sides almost straight from middle to base, side margins reflexed, posterior angles right angles, somewhat bluntly produced into a point, dorsal furrow distinct, base with a shallow double oblong depression on each side; elytra broader than thorax, slightly widened behind middle, deeply striated, the striae obsoletely punctured or quite impunctate; male with a strong elevated longitudinal carina ending in a tubercle on the last abdominal segment, of which traces may be seen in the female; legs pitch-black. L. 18-20 mm.

Under stones, loose bark, &c.; common and generally distributed.

P. vulgaris, L. (*melanarius*, Ill.). Deep black, shining; thorax subquadrate, with sides gradually rounded from front to base, posterior angles blunt, the apex produced into a more or less sharp tooth, margins reflexed, disc much wrinkled, dorsal furrow distinct and complete, base with two deep confluent foveæ on each side; elytra broader than thorax, dilated slightly behind middle, with deep impunctate striae; last abdominal segment simple in both sexes; legs black. L. 15-17 mm.

Under stones, &c.; common and generally distributed.

P. anthracinus, Ill. (*maurus*, F.). Deep black, antennæ black, sometimes partly fuscous and apex testaceous; thorax slightly transverse, sides rounded in front, contracted behind, posterior angles sharp right angles, apex acute, produced, dorsal furrow distinct, base with the usual depressions deep and strongly punctured; elytra strongly striated, striae obsoletely punctured, interstices rather flat; distinguished from all the other species by the little tooth at the sutural angle of elytra in female, and the deep depression on the anal segment in male. L. 9-11 mm.

Local, but widely distributed; marshy places, at roots of grass, &c.; formerly abundant at Notting Hill and Hammersmith Marshes (in the latter locality Dr. Sharp took a variety with the apices of the elytra simple); Whittlesea Mere; Bath; Christchurch, Hants; Tewkesbury; Tonbridge; Shipley; Dover; Hythe, Sheerness; Walton-on-Thames; Weybridge; Hornsea and Scarborough, Yorkshire; Scotland, Grampians (Rev. A. E. Hodgson); also recorded from Ireland.

P. nigrita, F. Very like the preceding in colour, size, and form, but less oblong, with the posterior angles of thorax less acute, and the basal foveæ shallower; distinguished also by having the sutural angle of the elytra simple, and by the fact that instead of being furnished with a depression the anal segment of male bears a small but distinct tubercle. L. 8-11 mm.

Damp places; at roots of grass, in moss, under stones, &c.; common and generally distributed throughout the kingdom.

P. gracilis, Dej. Smaller than the preceding species, shining black, with antennæ pitchy, with testaceous apex and the base of some of the joints reddish; thorax almost as in *P. anthracinus*; elytra strongly striated, the striæ plainly but finely punctured; anal segment simple in both sexes, the rudiments only of a raised line being traceable under a high power in male; legs pitch-black, tibiæ and tarsi lighter than femora. L. 8 mm.

Local; marshy places, at roots of grass, &c.; it formerly occurred at Notting Hill and in Hammersmith Marshes; Walton-on-Thames; Reigate; Burton-on-Trent; Whittlesea Mere and Wicken Fen; Crosby, Lancashire; Horsea, Yorkshire; Scotland, Dollar (A. Beaumont); Ireland, near Belfast, and Armagh.

P. minor, Gyll. Much smaller than the preceding; in size and general appearance it rather resembles at first sight the two following species; antennæ pitchy red, base lighter; thorax almost quadrate, with sides very slightly rounded and narrowed behind, posterior angles right angles, slightly projecting, dorsal furrow almost entire, base with two deeply punctured foveæ, variable in size, the space between them either smooth or punctured; elytra oblong, narrow, rather parallel-sided, striated, the striæ faintly punctured; anal segment of male furnished with a transverse raised keel; legs pitchy red. L. 6–6½ mm.

Marshy places, at roots of grass; local, but very common where it occurs. London and southern districts, widely distributed; common in the Midlands and Fen districts; Hornsea and Scarborough; rarer in the north of England; Scotland, local, Lowlands. Ireland, near Belfast.

(Sub-Gen. **Argutor**, Megerle.)

- I. Underside of thorax punctured at sides; legs reddish . . . *P. STRENUUS*, Panz.
 II. Underside of thorax smooth at sides; legs pitchy . . . *P. DILIGENS*, Sturm.

P. strenuus, Panz. (*erythropus*, Marsh). Pitch-black, antennæ and palpi brown red; thorax as long as broad, somewhat cordate, convex, with sides much rounded in front, contracted behind, posterior angles acute, base entirely punctured, with a deep oblong punctured depression on each side, central furrow distinct; elytra broader than thorax, strongly striated, the striæ plainly punctured, outer striæ much feebler; underside of thorax punctured at sides; legs reddish. L. 5½ mm.

Damp places, under stones, and at roots of grass; common and widely distributed, but not so abundant as the next species, with which it is very often confounded. Scotland, not common, Lowlands. Ireland, near Belfast.

P. diligens, Sturm (*strenuus*, Daws. G. D., *nec*, Panz.). Very like the preceding, but smaller and narrower, with the thorax less dilated at the sides and more gradually contracted behind, with posterior angles slightly more prominent; easily distinguished by the sides of the thorax

underneath being smooth and impunctate, and by the fact that the striae near margins of elytra are much less obsolete than in the allied species; legs much darker. L. 5 mm.

Common and widely distributed in England; Scotland, not common, Lowlands. I can find no record from Ireland, but probably it has been confounded with the preceding species.

(Sub-Gen. **Adelosia**, Stephens.)

P. picimanus, Duft. (*marra*, Marsh). Depressed, pitchy black or brown, shining, winged; head large, antennae brown or brown red with the first three joints glabrous; thorax nearly as broad as long, cordate, strongly contracted behind, anterior margin almost straight, posterior angles right angles, with plain central furrow, and two depressions at base, the outer one much the weakest; elytra very flat, almost parallel-sided, finely striated, with three large round impressions on third stria; underside and legs ferruginous. L. 11-13 mm.

Local, but not uncommon; damp places under stones and clods of earth, &c.; common in the London district; Portland; Sheerness; Canoe Chase; Stratford-on-Avon; Tewkesbury; Scarborough and Askham, Yorkshire; Hunstanton; Newnham-on-Severn; Sandown, Isle of Wight; banks of Tees; not recorded from Scotland or Ireland.

(Sub-Gen. **Pedius**, Motschulsky.)

P. inæqualis, Marsh. Rather elongate, depressed, shining, pitchy black or reddish, antennae and palpi red; thorax rather strongly rounded in front, contracted and sinuate behind, posterior angles sharp right angles, base entirely punctured, with a large deep oblong depression on each side; elytra somewhat parallel-sided, flat, strongly striated, the striae very distinctly punctured, almost crenulated, the base without scutellary stria; legs red. L. $5\frac{1}{2}$ mm.

Local, but in some places abundant; common in the London district, and in the Isle of Wight; Southend; Lynnington; Swanage; Tonbridge; Shipley, near Horsham; Newark; not recorded from the north of England, Scotland, or Ireland.

(Sub-Gen. **Lagarus**, Chaudoir.)

P. vernalis, Gyll. Black, shining; larger, broader, and more convex than the preceding; head smooth, antennae and palpi pitchy, first joint of antennae and apex of palpi red; thorax nearly as broad as long, moderately and evenly rounded, scarcely narrowed behind, posterior angles acute at tip, almost right angles; base punctured, with an oblong depression on each side situated in a wide fovea, and another, much smaller, near angles; elytra slightly broader than thorax, somewhat parallel-sided, with deep striae, which are feebly but distinctly punctured, third interstice with three pores, base without scutellary stria; legs pitchy black. L. $5\frac{1}{2}$ -6 mm.

Very abundant in marshy places, on the banks of rivers, under stones, at roots of grass, &c., throughout the greater part of England; Scotland, rare, Lowlands, Solway, Clyde; Ireland, near Belfast, local near Dublin, probably widely distributed.

(Sub-Gen. **Abax**, Bonelli.)

P. striola, F. Broad, depressed, oblong, almost rectangular, apterous, shining black, female somewhat duller; head large, antennae with the first three joints black and glabrous, the rest fuscous and pubescent; thorax quadrangular, slightly narrowed in front, not narrowed behind, posterior angles right angles, lateral margins broad and thickened, disc strongly wrinkled, central furrow deep, interrupted in front and behind, base with two very deep and distinct oblong foveae on each side; elytra broad, almost parallel-sided, rather broader at shoulders than base of thorax, deeply striated, seventh interstice raised at base into a keel, and other interstices raised at apex; legs pitchy black, tibiae and tarsi with red setae. L. 16-19 mm.

Common and generally distributed throughout England and Ireland; Scotland, rare, Lowlands.

It will be found that many of the black *Pterostichi* are rather hard at first to distinguish, but it is very easy to make out several of the most difficult by the male characters, which are very distinct. When we remember that the male may at once be known by its dilated tarsi, it is easy to see that the absence of any distinguishing character on the anal segment (e.g. in *vulgaris* and *gracilis*) is quite as conclusive as the presence of a distinct ridge or tubercle.

AMARINA.

This tribe has by many authors been included under the *Pterostichina*; it is, however, best regarded as separate; the character of the labial palpi (which have the terminal joint shorter than the penultimate, which is plurisetose in front) will serve to distinguish its members from those of the preceding tribe, from which, as a rule, they are entirely different in contour and general appearance, and, in many cases, in habits.

AMARA, Bonelli.

This genus (taken in its widest sense as including its several sub-genera) contains a large number of species which are almost entirely confined to the northern and temperate regions of Europe, Asia, and North America. We possess twenty-six species as British, of which no less than twenty-two are recorded from Scotland. When we find that out of our thirty-one species of *Harpali* only eight have been as yet found in that country, we are led to infer that the range of *Amara* is more boreal than that of *Harpalus*: this, however, must not be pressed too far, as we find thirty-four species of *Amara* recorded from Scandinavia, and no less than twenty-three species of *Harpalus*.

The larva and pupa of *A. convexiuscula* are figured by Schiödte (iii., Pl. xxi., Fig. 7). It is long and convex, with the head rounded and depressed, narrower than the prothorax, which is transversely hexagonal and margined; the head is dark; all the dorsal scuta are yellowish; the anal appendage is rather stout and the cerci short

the muscular impressions on the scuta are distinct; the legs are short with the claws equal. The larvæ of *A. spinipes*, *apricaria*, *familiaris*, and *patricia* differ from this larva chiefly in the formation of the clypeus and head; that of *A. apricaria* is white, with the head pale yellow, with the margin of the clypeus and mandibles ferruginous, and the dorsal abdominal and thoracic scuta yellowish-white.

According to Zimmermann the eggs are deposited under stones or at a small depth underground; the larvæ change their skin once, and attain, previous to becoming pupæ, twice the length of the imago; in general form they closely resemble those of *Zabrus* and *Pecilus*; they remain about six or eight weeks as larvæ, and half that time as pupæ. (*Vide* Westwood, Class. i., p. 71.)

In habits many of the Amare resemble *Zabrus*, notably perhaps those that belong to the sub-genus *Curtomotus* (some of which rather closely resemble that genus also in size and appearance). They are partly vegetable feeders and partly carnivorous; they are found at times devouring the seeds of plants in the ripe flower-heads, but they also appear to attack the stems, pith, and roots of grasses and various other plants, as well as being voracious devourers of the larvæ of other insects.

For the sake of convenience the genus may be divided into the following sub-genera, which, however, are of somewhat unequal value:—

- I. Prothorax narrowed feebly (sometimes hardly perceptibly) towards base; prosternal process margined at apex; posterior tibiæ in male densely pubescent on inner side *BRADYTUS*, Steph.
- II. Prothorax cordiform, sides strongly contracted at base; prosternal process not margined at apex; posterior tibiæ glabrous in both sexes *CURTOMOTUS*, Steph.
- III. Prothorax subquadrate, sides only slightly contracted in front, and straight or almost straight behind; posterior tibiæ glabrous in both sexes; upper surface as a rule not, or not strongly metallic.
 - i. Upper side strongly convex; anterior tarsi of male with the three dilated joints broadly cordiform; apex of prosternal process bearing several setæ *PERCOSIA*, Zimm.
 - ii. Upper side feebly convex; anterior tarsi of male with the three dilated joints more or less broadly triangular; apex of prosternal process bearing not more than two setæ or quite glabrous *CELIA*, Zimm.
- IV. Prothorax trapezoidal, very strongly contracted in front, widest at base; posterior tibiæ of male densely pubescent on their inner side.
 - i. Inner terminal spur at apex of anterior tibiæ simple *AMARA*, *i. sp.*
 - ii. Inner terminal spur at apex of anterior tibiæ tricuspid *TRIENA*, Leconte.

(Sub-Gen. **Bradytus**, Stephens.)

- I. Colour fulvous, with slight metallic reflection; thorax with sides strongly rounded in front *A. FULVA*, De. G.
- II. Colour dark (pitchy or bronze); thorax with sides not strongly rounded in front.
 - i. Form oblong, narrower; side border of thorax very plain *A. APRICARIA*, Payk.
 - ii. Form oval, broader; side border of thorax very narrow *A. CONSULARIS*, Duft.

A. fulva, De. G. Lighter or darker testaceous, or fulvous; antennæ testaceous; thorax very short and broad, strongly rounded in front, contracted at base, posterior angles sharp, prominent, dorsal furrow continued to apex and base, base with two punctured foveæ; elytra with a slight greenish or bluish metallic reflection, rather broader than thorax, convex, deeply striated, the striæ punctured (sometimes rather obscurely), except at apex; legs dark testaceous. L. 8–9 mm.

Sandy places, under stones and at roots of grass, both on the coast and inland; somewhat local, but widely distributed throughout England; Scotland, common Lowlands; Ireland, Portmarnock.

A. apricaria, Sturm. Smaller and much narrower than the preceding, pitch-black above with a metallic reflection on elytra, under-side red brown; antennæ and palpi red; thorax broadest in middle, narrowed moderately in front and slightly behind, posterior angles acute, prominent, central furrow continued to apex and base, base with two punctured foveæ on each side; elytra deeply striated, striæ strongly punctured, except at apex; legs red. L. 6–7 mm.

Common and widely distributed throughout the kingdom, both on the coast and inland, except in the extreme north of Scotland, from which district it has not yet been recorded.

A. consularis, Duft. Larger and broader than the preceding, pitch-black or black, shining, elytra of female sometimes metallic, under-side pitch-brown or reddish, antennæ red; thorax almost double as broad as long, convex, with sides slightly rounded in front, very slightly, almost imperceptibly contracted behind, dorsal furrow rather weak, base with two punctured foveæ on each side; elytra rather broader than base of thorax, deeply striated, the striæ punctured, somewhat crenate.* L. 7–8½ mm.

Sandy places, under stones, &c.; local and, as a rule, not common. London district (not uncommon). Sheerness, Chatham, Lewisham, Shirley, Wimbledon, &c.; Tamworth, Repton, Cannock Chase, Sutton Park (Birmingham), and other Midland localities; Brandon, Suffolk; Huntingdonshire; Hunstanton; Bridlington; Northumberland and Durham; Scotland, rare, Lowlands; Ireland, near Belfast and Dublin.

(Sub-Gen. **Curtonotus**, Stephens.)

I. Antennæ red; length 10–13 mm.

- i. Form somewhat ovate; anterior margin of thorax strongly punctured; intermediate tibiæ of male with three teeth on their inner side (the lower one small)

A. AULICA, Panz.

- ii. Form elongate; anterior margin of thorax almost impunctate; intermediate tibiæ of male without trace of a third tooth

A. CONVEXIUSCULA, Marsh.

II. Antennæ black or pitchy with base red; length 8–9 mm.

A. ALPINA, F.

* The punctuation of the elytra in this and certain other species of *Amara* is somewhat variable and not always to be depended upon as a character.

A. aulica, Panz. (*spinipes* Auct., *nov* Linn.). The largest of our species; upper side pitch-black, under side pitch-brown or reddish brown; antennae and palpi red; thorax very transverse, broadest about middle, sides very strongly rounded, and very much contracted behind, posterior angles very strongly projecting, base punctured in front and behind, with two deep depressions, the outer of which is bounded by a very strong raised fold; elytra broader than base of thorax, convex, deeply striated, the striae punctured; legs red. L. 10-13 mm.

Under stones, &c., and often on plants; generally distributed and common; not, however, recorded from the extreme north of Scotland.

A. convexiuscula, Marsh. More depressed and elongate, and narrower than the preceding; pitchy, or pitchy black, usually with a slight greenish metallic tinge; head and thorax narrower, anterior angles of latter more rounded, anterior margin hardly punctured, basal foveae shallower; elytra narrower with striae more distinctly punctured; legs and apex of abdomen red. L. 10-11½ mm.

Damp places on river banks and on the coast; under stones and by sweeping herbage. Local; Whitstable, Herne Bay, Gravesend, Greenwich, Sheerness; Camber Sand-hills, Rye; Margate; Walton-on-Naze; Liverpool; Ryde; Lymington Salterns; Yorkshire; Hunstanton; South Shields (not uncommon about the ballast heaps). Scotland, rare, Edinburgh and Aberdeen. Ireland, Salt Marshes near Cork.

A. alpina, F. Much smaller than either of the preceding, black, or pitchy black sometimes with metallic reflection; antennae black with base (one or more joints) red; thorax transverse, with sides not so strongly rounded or contracted behind as in the preceding species, base smooth in the middle with two strong foveae on each side, very coarsely punctured; elytra about as broad as middle of thorax, sometimes slightly narrower, strongly striated, the striae very plainly punctured. L. 8-9 mm.

Very rare; summit of "Grayvel" Rannoch, and Braemar; the specimens from the former place belong to the variety with dull reddish elytra, with the suture broadly and obscurely darker. Dr. Sharp's specimen, from Braemar, which I have before me, is quite black with two joints of the antennae bright red, and the third more obscurely red: it appears to be a very variable insect as regards colour.

(Sub-Gen. **Percosia**, Zimmermann.)

A. patricia, Duft. (*equestris*, Duft.). Black or pitch-black, very shining, underside brown red, margins of thorax sometimes reddish; mouth and antennae red; thorax much broader than long, with sides slightly narrowed in front, straight behind, posterior angles right angles, very slightly prominent, side margins rather strong, central furrow distinct, base with two strong punctured foveae on each side covering almost the whole space between the dorsal line and the angles; elytra broad oval, a little broader at base than base of thorax, strongly striated, the striae plainly punctured; legs red; the male has the intermediate tibiae moderately curved. L. 8-10 mm.

Local and rare. Chalky and sandy places, under stones and at roots of grass; Folkestone, Deal, Herne Bay, Box Hill, Gomshall, Reigate, Charlton, Chatham, Mickleham, Plumstead; shores of Bristol Channel; Cannock Chase; Barmouth; Isle of Man; North Wales; Scotland, very rare, Lowlands, Tweed, Forth.

(Sub-Gen. **Celia**, Zimmermann.)

- I. Antennæ short; joints 4-10 almost moniliform;
scutellary stria absent or very indistinct **A. INFIMA**, Duft.
- II. Antennæ with joints 4-10 elongate; scutellary
stria present.
- i. Striæ on elytra stronger; interstices in male
rather convex; anterior angles of thorax pro-
minent **A. RUFOCINCTA**, Sahlb.
- ii. Striæ on elytra feebler; interstices broad and
flat.
1. Form narrower; legs entirely yellow, or
reddish yellow **A. LIVIDA**, F. (*bifrons*, Gyll.).
2. Form broader; legs red, femora more or less
pitchy.
- A. Anterior angles of thorax not prominent;
eyes prominent; reflection dull bronze **A. FUSCA**, Dej.
- B. Anterior angles of thorax prominent;
eyes rather flat; reflection reddish bronze **A. QUENSELII**, Schön

A. infima, Duft. (*granaria*, Dej.). Head and thorax shining black; elytra bronze, coppery, or purplish black; palpi and antennæ pitchy, the base of the former and two joints at the base of the latter clear red; thorax broad and short, convex, gradually rounded in front, slightly narrowed behind, posterior angles nearly right angles, dorsal line entire, base with two foveæ on either side, rather strongly punctured; elytra ovate, rather wider than thorax, sides very slightly rounded, distinctly striated, the striæ punctured; legs pitchy. L. 4-4½ mm.

This species could only be confounded with *A. tibialis*, from which its short convex thorax and short antennæ at once distinguish it.

Rare; sandy places inland and on the coast at roots of grass; Deal; Chobham; Weybridge.

A. rufocincta, Dej. (*prætermissa*, Sahlb.). Pitchy black, shining, sometimes with a reddish tinge, or brownish testaceous; lateral margins of thorax narrowly red, more distinctly so in paler individuals; antennæ and palpi testaceous red; thorax broad and convex, in the middle somewhat broader than the elytra, contracted from middle to apex, almost straight to base, posterior angles right angles, dorsal furrow strongest in centre, base with two foveæ on either side, these and the space about them coarsely punctured; elytra hardly as wide as thorax, deeply striated, the striæ deeper towards apex, punctured for two-thirds of their length; legs red. L. 5-7 mm.

Local, but not rare in some localities; chalky places, at roots of grass, &c; Mickleham, Croydon, Reigate, Gomshall, Caterham, West Wickham; Freshwater, Isle of Wight; Bournemouth; Deal; Hastings; Barmouth; Scarborough. Scotland, very rare, Lowlands, Forth, Clyde; Ireland, Portmarnock.

A. livida, F. (*bifrons*, Gyll., *orichalcica*, Daws. G. D., *rufocincta*, Sahlb., *new* Dej.). Oblong ovate, brassy brown, occasionally greenish; antennæ and palpi entirely reddish yellow; head small with projecting eyes; thorax much broader than long with sides very slightly rounded, feebly contracted in front, straight behind, posterior angles right angles, these together with the side margins reddish, dorsal furrow feeble at apex and base, base depressed, punctured, with two large strongly punctured foveæ on each side; elytra scarcely broader than thorax, moderately striated, the striæ evidently punctured; legs entirely reddish yellow. L. 5-7 mm.

This species somewhat resembles *A. familiaris*, but may at once be distinguished by its entirely red-yellow antennæ and the coarsely punctured base of thorax.

Local, but not uncommon; sandy and gravelly places; widely distributed throughout the country from north to south; Scotland, local, Lowlands; also an Irish species.

A. fusca, Dej. Fusco-ræneous, with feeble bronze reflection in female, stronger in male, under side pitchy; upper side flat, rather dull; head small, eyes very convex and prominent, antennæ and palpi red; thorax transverse, subquadrate, slightly narrowed in front and very slightly behind (more so in female than in male), posterior angles blunt right angles, dorsal furrow fine but distinct, base almost impunctate in middle with two punctured foveæ on each side; elytra distinctly broader than thorax, finely striated, the striæ finely but distinctly punctured, interstices flat, side margin reddish at apex. L. 8 mm.

There is considerable confusion as to this species, as both *ingenua*, Duft., and *fusca*, Dej., have been included in our lists, and it is almost certain that we only possess the latter, which only differs from the former in being considerably flatter and of more parallel form, with lighter antennæ and legs, a less robust head, but much more prominent eyes, the thorax less transverse, the elytra less strongly striated, &c. Dawson's description of *ingenua* (Geod. Brit. 125) will apply equally well to either species, and, therefore, as it is certain that the Swansea specimens belong to *fusca*, and as he himself compared these with his own (Ent. Ann. 1858, 53), it is most probable that his single specimen from Scotland was also that species, and that we do not possess *ingenua* at all.

Very rare; a considerable number of specimens were taken at Swansea by Mr. H. Adams many years ago. Doncaster (Dr. J. W. Ellis, who informs me that there is no doubt as to the locality of the specimen); Plumstead (W. West); Newcastle (Wailles); Scotland, one specimen recorded by Dawson, with no locality, as *A. ingenua*.

A. Quensellii, Schön. Upper side dark brassy, reddish, metallic reflection more or less distinct, female duller than male; elytra occasionally non-metallic, dull ferruginous, with greenish thorax; head

small, eyes prominent, antennæ as a rule red, sometimes however brownish with the basal joints lighter; thorax much broader than long, sides moderately rounded in front, almost straight towards base, in some specimens slightly contracted, posterior angles more or less sharp right angles, dorsal furrow distinct, base very variably punctured, sometimes almost impunctate, with two deep and rather irregular foveæ on each side; elytra at base slightly broader than base of thorax, finely striated, the striæ more or less punctured, but sometimes so obsoletely that the punctures are almost invisible, interstices flat, underside dark brown, black, or reddish; legs lighter or darker brown red; in minor points the specimens vary considerably. L. 5-7 mm.

A mountain species; very local in the Dee district of Scotland; it occurs on the Continent in mountain districts from Lapland to the Caucasus, often at very considerable elevations. I have before me Dr. Sharp's large and fine series from Braemar, which shows many of the slight variations above alluded to; none of the specimens, however, are as metallic as a Continental specimen sent me by Herr Reitter.

(Sub-Gen. **Amara**, i. sp.)

- I. Scutellary stria with a large pore at base; average length at least 9-10 mm.; anterior angles of thorax projecting in an obtuse point.
 - i. Intermediate tibiæ of male pubescent behind.
 1. Form broader; tibiæ dark A. OVATA, F.
 2. Form narrower; tibiæ light A. SIMILATA, Gyll.
 - ii. Intermediate tibiæ of male glabrous behind A. ACUMINATA, Payk.
- II. Scutellary stria with or without pore at base; length not exceeding $7\frac{1}{2}$ mm.; anterior angles of thorax rounded, not projecting A. NITIDA, Sturm.
- III. Scutellary stria without pore at base, sometimes entirely absent; intermediate tibiæ almost glabrous; length not exceeding 8 mm.; anterior angles of thorax projecting in an obtuse point.
 - i. Scutellary stria absent; length 5 mm. A. TIBIALIS, Payk.
 - ii. Scutellary stria present.
 1. Antennæ with not more than two first joints (sometimes only first) red.
 - A. Depressions at base of thorax small or obsolete but visible; thorax at base as broad as elytra.
 - a. Tibiæ black; apex of anterior tibiæ projecting between the terminal spine and the first joint of the tarsi A. LUNICOLLIS, Schödte.
 - b. Tibiæ reddish or brownish; anterior tibiæ without angular projection at apex A. CURTA, Dej.
 - B. Depressions at base of thorax distinct; tibiæ reddish A. SPRETA, Dej.
 2. Antennæ with three basal joints (and sometimes base of fourth) red.
 - A. Legs entirely red.
 - a. Anterior margin of thorax emarginate; angles projecting A. FAMILIARIS, Duft.
 - b. Anterior margin of thorax straight; angles rounded A. LUCIDA, Duft.

B. Legs dark, except tibiæ, which are lighter.

a. Striæ on elytra feeble, not deeper behind. . . A. TRIVIALIS, Gyll.

b. Striæ on elytra strong, deeper behind.

a*. Series of pores on 9th interstice of elytra widely interrupted in middle; elytra narrower, less oval A. COMMUNIS, Panz.

b*. Series of pores on 9th interstice of elytra regular from base to apex; elytra wider, more oval A. CONTINUA, Thoms.

A. ovata, F. (*obsolata*, Dej.). Ovate, broad, brassy, occasionally greenish or bluish, sometimes almost black; antennæ with the three first joints and base of the fourth red; thorax transverse, narrowed in front, anterior angles prominent, broadest at base, posterior angles somewhat obtuse, dorsal furrow fine, base impunctate, with two more or less obsolete furrows on each side, the outer one often imperceptible, the inner one often resolving itself into a small deep depression removed to some distance from basal margin; elytra broad, plainly striated, the striæ becoming deeper at apex, not punctured; legs quite black. L. 9-11 mm.

Widely distributed throughout England from north to south, but it cannot be called common. Scotland, not common, maritime, Tweed, Forth, Solway, Clyde; it is, however, by no means a maritime species exclusively. I can find no record from Ireland.

A. similata, Gyll. (*obsolata*, Duft.). Smaller, as a rule, and narrower than the preceding, and usually more brassy; the thorax is not so broad at the sides, nor so much widened at base, and the basal impressions are less obsolete and more or less punctured; striæ of elytra presenting traces of feeble punctuation; tibiæ reddish. L. 9-10 mm.

In distinguishing this from the preceding species too much stress must not always be laid upon the light tibiæ, as somewhat immature specimens of *ovata* have the legs lighter: the broad form and impunctate base of thorax are more reliable characters for that species.

Widely distributed and usually common throughout England, especially in the south; apparently not recorded from Scotland; Ireland, common near Dublin.

A. acuminata, Payk. (*curvata*, Dej., *rufgaris*, F.). Ovate, very broad, shining brassy, sometimes greenish or blackish; antennæ with the three first joints and base of the fourth red; thorax narrowest in front, broadest at base, posterior angles rather sharp, but not produced laterally, dorsal furrow abbreviated in front and behind, base with a short and deep fovea at some distance from hind margin, and a shallow impression, sometimes obsolete, near the angles; elytra more acuminate at apex than in the other species, finely but sharply striated, the striæ impunctate, third, fifth, and seventh interstices often slightly raised; legs entirely black. L. 9-11 mm.

Widely distributed, but local; not common in the London district; Faversham, Chatham, Mickleham, &c.; Margate; Repton; Bridlington; Northumberland and Durham; Scotland, common Lowlands, also occurs in the Moray district; Ireland, near Belfast, and not uncommon near Dublin.

This species very closely resembles *A. orata*, but besides the fact that the intermediate tibiae of male are entirely glabrous, it is rather broader and larger, as a rule, than that species, and has the apex of the elytra more acuminate, the striae deeper, and the interstices more convex.

A. nitida, Sturm. Ovate, upper side bronze or metallic green, very smooth and shining; antennae black with the three first joints and base of fourth red; thorax broader than long, slightly broader at base than base of elytra, narrowed towards the front, anterior angles rounded, not projecting, base impunctate, basal impressions absent or very faintly traceable; the usual pore at the posterior angles is placed close to the base and at some little distance from the sides; elytra with the striae plainly stronger towards apex, interstices smooth; femora black, tibiae reddish, tarsi brownish red. L. $7\frac{1}{2}$ mm.

This species has been lately introduced into the British fauna on the authority of a specimen taken by Mr. Gillo near Bath, and named as above by M. Bedel; I have recently received two old specimens of an *Amara* from Warwickshire which appear to belong to this species; they were sent me by Mr. E. Clark.

This species differs from *A. communis* and *A. lunicollis* by the sculpture of the thorax and the rounded anterior angles of the same; its form also is shorter and more oval.

A. tibialis, Payk. The smallest species of the group, oval, convex, shining brassy, or brassy black, sometimes with greenish reflection; antennae dark with first three joints (sometimes two) red; thorax transverse, slightly contracted in front, broadest at base, posterior angles right angles, dorsal furrow deepest in middle, base with two distinct and deeply impressed foveae; elytra finely striated, the striae plainly punctured, scutellary stria absent; legs black, tibiae lighter. L. 4 mm.

Easily distinguished from all the allied species by its small size, the deeply impressed foveae at base of thorax, and the absence of the scutellary stria on the elytra, which is at most occasionally indicated by a few punctures.

Widely distributed and locally abundant in England; Scotland, local, Lowlands; Ireland, near Belfast, not common near Dublin, probably widely distributed.

A. lunicollis, Schiödte (*vulgaris*, Panz., *nec* Dawson, G. D.). Of the size of one of the largest examples of *A. communis*, which species it strongly resembles, but distinguished by having at most two joints of the antennae red, and the fact that the base of the thorax is almost entirely impunctate, and also by the colour of the legs, which are usually entirely black, whereas in *communis* the tibiae are distinctly lighter; the thorax is longer in proportion than in some of the allied species, with central furrow and basal foveae often very indistinct, posterior angles somewhat obtuse; elytra plainly but rather finely striated, the striae somewhat deeper behind, and occasionally obsoletely punctured in front. L. $7-7\frac{1}{2}$ mm.

Marshy places, at roots of grass, trees, &c.; local but not uncommon; London district generally; Burton-on-Trent, Repton, Cannock Chase and other localities in the Midlands; Newnham-on-Severn; Hastings; Bournemouth; Newcastle; Scotland, not common Lowlands; Ireland, local.

A. curta, Dej. (*brunnicornis*, Heer.). Much smaller and shorter than the preceding, and less convex, usually obscure brassy black or bronze; antennæ with two first joints (sometimes one only) and occasionally base of third red; thorax broad, contracted in front, broadest at base, hind angles somewhat acute, dorsal furrow fine terminated in front and behind by some fine longitudinal striæ, basal foveæ, especially the outer one, more or less obsolete; elytra broad and rather short, plainly but rather finely striated, striæ deeper at apex, very finely, almost imperceptibly punctured; legs black, tibiæ lighter. L. $5\frac{1}{2}$ –6 mm.

Very local; sandy places on the coast at roots of grass, &c., also inland; common on the sand-hills at Deal, also taken at Brighton; in the spring of 1877 I took a single specimen in my garden at Repton, near Burton-on-Trent; I know of no other English locality, but Dr. Sharp records the species as very local in the Forth district of Scotland, "Common about an old well on Corstorphine Hills;" there is, therefore, no reason why the species should not occur in other intermediate districts; it ranges over the whole of central Europe, reaching as far north as Stockholm, but is always local.

A. spreata, Dej. Very like *A. trivialis* in general appearance, but larger and broader; it has, moreover, only two joints at the base of the antennæ red; the colour is rather variable, being usually brassy or coppery, sometimes bright green, duller in female; the thorax is not so much contracted in front as in the allied species, with central furrow very distinct, especially in centre, becoming almost if not quite obsolete in front and behind, posterior angles distinct, rather sharp, base with two plainly marked foveæ, the inner one stronger than the outer, diffusely and coarsely punctured throughout in male, more obsoletely in female; elytra finely striated, the striæ finely but very distinctly punctured, not deeper at apex; interstices dull, very plainly shagreened; femora and tarsi black, tibiæ ferruginous. L. $6\frac{1}{2}$ mm.

Sandy places; at roots of grass, &c.; very local; Deal; Mickleham; Cannock Chase; Hertford; South Shields; Scotland, very rare, Fifeshire (Murray).

A. familiaris, Duft. Brassy or greenish, occasionally blackish; antennæ with three first joints and base of fourth red; thorax broad strongly emarginate in front, anterior angles projecting, posterior angles almost right angles, central furrow fine, base impunctate, with two very obsolete, and often almost invisible foveæ; elytra finely striated, the striæ very finely but usually distinctly punctured, rather deeper at apex; legs entirely red, tarsi rather darker. L. 6 mm.

Common and abundant throughout the kingdom as far north as the Moray district of Scotland; not, however, recorded from the extreme north; it is common over the whole of Europe.

A. lucida, Duft. Extremely like the preceding, of which it might

easily be supposed to be a small variety; the eyes, however, are more prominent, and the anterior margin of thorax much less emarginate, and therefore the anterior angles are much less projecting; but for these differences, which after all are comparative, as may be seen by examining the insects side by side, this species might with very good reason be suppressed as a small variety of *A. familiaris*. L. $4\frac{1}{2}$ –5 mm.

Sandy places; at roots of grass and in moss. Local, but occasionally found in abundance on the coast, rare inland. Deal; Hastings; Sheerness; Forest Hill; Reigate; Shirley; Colchester; Liverpool district; Bath; Llangollen; Swansea; Barmouth; Bournemouth; Isle of Wight; Weston-super-Mare; Whitley, near Newcastle-on-Tyne, very rare; Scotland very rare, Moray district.

A. trivialis, Gyll. Variable in colour, brassy, greenish, bluish, or almost black; female duller; antennæ with three first joints and base of the fourth red; thorax moderately rounded from apex to base, broadest at base, posterior angles right angles, dorsal furrow abbreviated in front and behind, base with two impressions on each side, the outer one usually obsolete, the inner often taking the form of a small deep fovea removed to some distance from hind margin, base impunctate or nearly so; elytra narrowed at apex, finely striated, the striae scarcely perceptibly punctured, deeper at apex; femora and tarsi black, tibiae pitchy or pitchy red. L. 6 mm.

Common as a rule throughout the kingdom, but not recorded from the extreme north of Scotland, and said to be local near Dublin, which is the only Irish record that I can find; it is, however, most probably common in Ireland; it ranges from the Azores and Morocco to Siberia; it may be seen in abundance in early spring on roads and pathways running in the sun.

A. communis, Panz. (*rufularis*, Daws. G. D.). Brassy, sometimes greenish, or bluish-black, shining; antennæ with the first three joints and base of the fourth red, but occasionally the upper side of the third joint is brownish, in which case the whole fourth joint is brown; thorax rather strongly emarginate in front with the anterior angles produced, gradually rounded from apex to base, posterior angles right angles, but not sharp, dorsal furrow fine, base minutely and obsoletely punctured with two more or less obsolete foveæ on each side (occasionally it is impunctate and the foveæ almost imperceptible); elytra plainly striated, the striae distinctly deeper behind, usually obsoletely punctured towards base; femora and tarsi pitchy, tibiae (and occasionally also tarsi) ferruginous.

Widely distributed throughout England and Ireland, and common in many places, but somewhat local. Scotland, not common, reaching as far north as the Moray district.

A. continua, Thoms. (*convexior*, Steph.). This species, which has been separated by Thomson from the preceding, differs from *A. communis* so slightly, that it is a question whether it ought to be regarded as anything more than a variety: it comes between *A. lunicollis* and *A. communis*, having the build of the former insect, and also (like *lunicollis*) having the row of large punctures on the margin of the elytra con-

tinuous and not widely interrupted, as in *A. communis*; it has, however, three joints at the base of the antennæ testaceous, whereas *A. lunicollis* has but two. L. $7-7\frac{1}{2}$ mm.

Apparently mixed in collections with the preceding, and not uncommon.

(Sub-Gen. **Triæna**, Leconte.)

- I. Base of thorax impunctate; striae of elytra plainly punctured; length 8 mm. *A. STRENUA*, Zimm.
- II. Base of thorax punctured; striae of elytra very obsoletely punctured; length 6 mm. *A. PLEBEIA*, Gyll.

A. strenua, Zimm. Brassy, greenish, bluish, or bluish-black, thorax and elytra not always concolorous; antennæ with the first three joints and base of the fourth red; thorax with sides moderately contracted in front, anterior angles scarcely prominent, posterior angles sharp, dorsal furrow ending in a longitudinally striated shallow depression in front and behind, base impunctate, with two foveæ on each side, the outer one more or less obsolete; elytra rather long, plainly striated; the striae are distinctly punctured until they become deeper at apex, when the punctures cease; femora pitchy black, tibiae and tarsi ferruginous: the anterior tibiae have the spine at the apex tricuspid, which is the chief distinguishing character of this and the next species. L. 8 mm.

Common in early spring in the salt marshes near Ryde, Isle of Wight: Dawson (Ent. Ann. 1858, 53) recorded it from the Isle of Sheppy, but this may have been in error, as it has not occurred there since, and no other authentic locality is known except the Isle of Wight.

A plebeia, Gyll. Very shiny, brassy or greenish, antennæ with first three joints and base of fourth red; thorax rather more emarginate in front than in the preceding species, so that the anterior angles are more strongly produced, sides gradually rounded from apex to middle, thence straight to base, posterior angles sharp produced owing to the basal margin being sinuate, dorsal furrow more distinct in middle, base with two shallow but usually distinct, coarsely punctured foveæ on each side; elytra distinctly striated, the striae impunctate or very obsoletely punctured; femora and tarsi pitchy-black, tibiae testaceous: the spine at the apex of the anterior tibiae is tricuspid. L. 6 mm.

Common and widely distributed throughout England; Scotland, common as far north as the Moray district; Ireland, local near Dublin.

ANCHOMENINA.

The members of this tribe may be separated from the *Pterostichina* and *Amarina* by the fact that the subapical margins of the elytra are continuous, whereas in the two last-mentioned tribes they are interrupted, the severed apical portion of the margin continuing as a sharp ridge along the under surface of the elytra: it is true, as Mr. Bates says (Biol. Cent. Amer. Carabidae, p. 91), that there are indications of the

ridge in the *Anchomenina*, but it is faintly elevated and not distinctly continuous with the apical part of the margin. We possess six genera, *Calathus*, *Taphria*, *Sphodrus*, *Pristonychus*, *Anchomenus* and *Olisthopus*; Horn and C. G. Thomson include *Masoreus*, and its allied genera, as a separate tribe Masoreina, forming a transition from the *Anchomenina* to the *Lebiina*. Mr. Bates, however, considers the Masoreina to be undoubted Truncatipennes, and to form a tribe under them equivalent to the *Lebiina*. In a letter he kindly wrote to me on the subject he says, "There are seven or eight genera of Masoreina, and an equal number of allied generic forms having similar long tibial spurs, all undoubtedly Truncatipennes. As to the query, 'Is Masoreus not a transition to the *Lebiina*?' I may say that there are many other genera of undoubted Truncatipennes of which this may more truthfully be said, e.g. genera of Thyreopterina, which are exactly like *Anchomenina*, and can only be distinguished by dissection of the mouth."

Our genera may be distinguished as follows:—

- I. Tarsal claws strongly pectinate or toothed.
 - i. Thorax square or trapezoidal; first joints of middle and posterior tarsi with a distinct furrow running along their external surface *CALATHUS*, Bon.
 - ii. Thorax with sides rounded; joints of tarsi without furrow *TAPHRIA*, Bon.
- II. Tarsal claws with a slight trace of denticulation at base; third joint of antennæ shorter than the two following together; tarsi pubescent *PRISTONYCHUS*, Dej.
- III. Tarsal claws quite simple; tarsi not pubescent.
 - i. Third joint of antennæ as long as the two following joints together; length 20–24 mm. *SPHODRUS*, Clairv.
 - ii. Third joint of antennæ shorter than the two following together; length not exceeding 11 mm., usually much less.
 1. Emargination of mentum with tooth *ANCHOMENUS*, Bon.
 2. Emargination of mentum without tooth *OLISTHOPUS*, Dej.

CALATHUS, Bonelli.

This genus comprises upwards of a hundred species, which are almost entirely confined to the northern hemisphere; they are mostly of a black or brown colour; they are usually found under stones, fallen leaves, or moss, and at the roots of trees, and are exceedingly swift runners, and very active in their movements.

The larva of *Calathus Gallicus* is described, with coloured figure, by Laboulbène (Ann. Fr. 1862, p. 562, Pl. xiii., Fig. 8–15). It is elongate and depressed with all the segments, including head, of about equal breadth, becoming slightly narrower towards apex of abdomen; the whole upper surface is black, the abdominal scuta being large and covering the entire surface of the segments; the maxillæ, labrum, and antennæ are yellowish, and the legs ferruginous; the cerci and anal appendage are short. Length 21–22 mm.

- I. Male with the first three joints of the anterior tibiæ dilated and squamulose beneath.
 - i. Elytra with a series of pores on the 3rd and 5th interstices (or stria) of elytra *C. CISTELOIDES*, Panz.

- ii. Elytra without pores on the 5th interstice, and only two or three on 3rd.
1. Posterior tarsi with first joint rather flattened on its interior border; insect winged *C. FUSCUS*, F.
 2. Posterior tarsi with first joint convex on its interior border; insect apterous.
 - A. Posterior angles of thorax right angles, colour black *C. FLAVIPES*, Fourc.
 - B. Posterior angles of thorax very blunt or rounded.
 - a. Head yellow or pitchy brown; episterna of metathorax prolonged behind *C. MOLLIS*, Marsh.
 - b. Head black; episterna of metathorax rather short.
 - a*. Thorax red or red with dark disc; border of posterior angles very narrow, not raised *C. MELANOCEPHALUS*, L.
v. *nubigena*, Hal.
 - b*. Thorax except extreme margins dark; border of posterior angles broad, raised *C. MICROPTERUS*, Duft.
- II. Tarsi simple in both sexes (*Amphigynus*, Haliday) . . . *C. PICKES*, Marsh.

C. cisteloides, Panz. (*fuscipes*, Geze, *flavipes*, Payk.). Black, apterous, antennæ and palpi pitchy, more or less red, basal joint entirely red; thorax subquadrate, as long as broad, slightly narrower in front, posterior angles blunt right angles, dorsal furrow usually abbreviated in front and behind, but sometimes distinct throughout, base coarsely punctured with two foveæ on each side, the outer one more or less obsolete; elytra at base broader than base of thorax, rather deeply striated; the fifth stria and the third interstice are each furnished with a row of pores, the latter row as well as the former being often situated in the stria itself; legs entirely red, or red with pitchy femora, or entirely black. L. 9-12 mm.

In moss, under stones, &c.; very common and widely distributed throughout the kingdom.

C. fuscus, F. (*amblygnus*, Payk.). Broad, entirely fuscous brown, with the margins of thorax, palpi, antennæ and legs testaceous; thorax subquadrate, somewhat narrowed in front, posterior angles slightly acute, dorsal furrow distinct, base with a very broad smooth shallow depression on each side; elytra almost oval, finely striated, the striae impunctate, third interstice with two pores: smaller specimens are very likely to be confounded with *C. mollis*, and darker ones with *C. flavipes*, but they may be easily distinguished by the distinct flattening or hollowing of the inner side of the first joint of the tarsi, which is not perceptible in those species; the wings in the European specimens are well developed, but Wollaston (Ins. Mad., p. 31) records a race from Madeira which is entirely apterous, or has only rudimentary wings. L. 9-10 mm.

Sandy places, beneath dry dung, moss, &c.; local, but widely distributed along the southern coasts of England and Wales; it is rarer in the north, and I can find no record from Ireland. Scotland, local, Forth, Moray.

C. flavipes, Fourc. (*crucopus*, Steph., *fulvipes*, Gyll., *crucatus*, Sahlb.).

Black, very shining, apterous, exceedingly like *C. cisteloides*, but at once distinguished by the absence of pores on the fifth stria; it is more parallel also, and generally smaller, and the base of thorax is less punctured; in fact, as a rule, it is impunctate, or almost so; the margins of the thorax are reddish; the male often has a greenish metallic tinge on the elytra, such as is often seen on some of the black *Anchomeni*, and the female is duller; palpi, antennæ, and legs red. L. 8-10 mm.

Sandy places, at roots of grass and plants, &c.; local, but abundant where it occurs. Scotland, local, maritime, Forth, Clyde, Moray. Ireland, near Belfast and Dublin, and probably widely distributed.

C. mollis, Marsh (*ochropterus*, Sturm). Apterous; pitchy brown with margins of thorax and elytra testaceous, sometimes entirely light brown; thorax subquadrate, somewhat rounded in front, posterior angles very blunt, dorsal furrow fine, base with a shallow but distinct fovea on each side; elytra very finely striated, strongly rounded, distinctly widest in middle, much more plainly wider than thorax than in the allied species, third interstice with from three to five pores; antennæ, palpi, and legs pale testaceous. L. 6-7 mm.

Sandy coasts, at roots of grass and plants on sand-hills, under stones, tidal refuse, &c.; common and widely distributed throughout England; Scotland, local, maritime, as far north as the Moray district; Ireland, near Dublin. Dawson mentions it as very abundant in Scotland and Ireland as well as in England (G. D. 77).

C. melanocephalus, L. Apterous; head black, antennæ and palpi reddish testaceous; thorax red or yellowish-red, subquadrate, rather narrowed in front and slightly narrowed behind, posterior angles blunt, dorsal furrow fine, base with a shallow impression on each side, sometimes plain, sometimes almost obsolete; elytra oblong-ovate, black, often with a slight greenish reflection, side margins very narrowly red, finely striated, third interstice with three or four pores; legs reddish testaceous. L. 6-7 mm.

The *v. rubigena*, Hal. (*C. alpinus*, Dej.), differs from the type form, in being, on an average, smaller, and in having the thorax more or less clouded with black, and sometimes entirely black; Dr. Sharp has in his collection some very dark specimens from Braemar, in which even the margins of thorax are black; in these cases the antennæ are darker, and the legs more or less pitchy: these dark examples cannot therefore be confounded with *C. micropterus*, which has the margins of the thorax, and the legs and antennæ clear testaceous, or at most slightly reddish.

This variety was first discovered by Mr. Haliday on the mountains of Ireland, where it is not uncommon in Wicklow, &c.; it is also not uncommon on the higher hills and mountains of Scotland. It appears, however, to be merely an alpine form of the type, and to have no claim to be considered a separate species.

Common and widely distributed throughout the kingdom: the most abundant species of the genus.

C. micropterus, Duft. Very shining, black or pitchy black, apterous; head black, antennæ and palpi testaceous; thorax slightly contracted in front and behind, broadest in middle, with side margins narrowly testaceous, slightly reflexed, posterior angles obtuse, dorsal furrow plainest in middle, base with a rather distinctly impressed fovea on each side; elytra finely striated with three, sometimes four, pores on the third interstice; legs testaceous. L. 7 mm.

A species almost entirely confined to hilly or mountainous districts; Llangollen and other localities in Wales; Church Stretton; Cannock Chase; Cheviots; Scotland, common, both lowlands and highlands, Raunoch, Arran, Braemar, &c. Ireland, Donegal.

C. piceus, Marsh (*rotundicollis*, Dej.). Black, or pitch-black, rather shining, apterous; mandibles pitchy, antennæ and palpi ferruginous; thorax rather strongly rounded and narrowed in front, and more contracted behind than in our other species of the genus, side margins reflexed especially at base, more or less distinctly ferruginous, posterior angles rounded, dorsal furrow interrupted in front and behind, base with a large smooth fovea on each side, the space between them smooth, raised; elytra ovate, plainly broader at base than base of thorax, with shoulder angles free, projecting, not strongly striated, third interstice with four or five pores. L. 8-10 mm.

Sandy places beneath moss and dead leaves; local, but not uncommon, and widely distributed throughout England and Ireland. Scotland, scarce, lowland, but reaching as far north as the Moray district.

Besides the fact that the tarsi are simple in both sexes, this species differs from all the others in minor particulars; the distinction of the tarsi, however, appears quite sufficient to give it generic value, and I should feel strongly inclined to revive Haliday's name of *Amphigynus*, and restore the genus.

TAPHRIA, Bonelli. (*Synuchus*, Gyll.)

This genus comprises about half-a-dozen species, which form a transition between *Calathus* and *Anchomenus*; they differ from *Calathus* in having no furrow on the upper sides of the intermediate and posterior tarsi, from *Anchomenus* in having the claws pectinate, and from both in having the last joint of the labial palpi securiform; the genus is, however, more closely connected with *Calathus* than with *Anchomenus*; the species are confined to Europe and Siberia.

T. nivalis, Panz. (*vivalis*, Ill.). Pitch-black, very shining; antennæ and palpi testaceous red; thorax somewhat broader than long, almost orbicular, with sides and anterior and posterior angles rounded, margins sometimes reddish, dorsal furrow distinct, base with a deep smooth fovea on each side at base; elytra long oval, somewhat broader than thorax, rather strongly striated, the striae impunctate, with two pores in or near the second stria; legs red. L. 6-7 mm.

Damp places, under stones, &c. ; local, and widely distributed, but it can hardly be called a common insect. London district; Reigate; Bournemouth; Isle of Wight; Deal; Hastings; Tonbridge; Swansea; Repton, Bewdley, and many other Midland localities; Cheshire; Yorkshire; Northumberland and Durham; Scotland, scarce, but ranging as far as the Orkney Islands; Ireland, near Belfast and Dublin, and in Donegal.

PRISTONYCHUS, Dejean. (*Læmostenus*, Bon.)

The species of this genus, as well as those of the genera *Cryptotrichus*, *Antisphodrus* and others, are included by some authors under the genus *Sphodrus*. Although *Pristonychus* is closely connected with *Sphodrus*, yet it is better regarded as a transitional genus between *Calathus* and *Taphria* on the one hand, and *Sphodrus* and *Anchomenus* on the other, as seems to be indicated by the denticulation of the claws: our species is easily distinguished by its pubescent tarsi. The genus contains about forty species, chiefly from Europe and the districts round the Caucasus; many, however, have been sunk as varieties; they are often found in cellars and holes underground, sometimes under the bark of trees; many of them, however, are found in mountain districts under large stones and in caves.

P. terricola, Herbst. (*inæqualis*, Panz., *subcyaneus*, Ill.). Elongate, and very gracefully proportioned, cyaneous, rather shining, antennæ and palpi pitchy; thorax cordate, with sides rounded in front, strongly contracted behind, posterior angles prominent, disc transversely wrinkled, dorsal furrow terminated in front in a deep triangular depression, base rugose with a strong curved fovea on either side; elytra ovate, broadest in middle, rather strongly striated, the striæ very finely punctured, and uniting in pairs at apex, sometimes an outer and inner stria being joined, and the others uniting in pairs within it, sometimes uniting in pairs beginning from the sutural or second stria; occasionally the same specimen exhibits both these peculiarities on the right and left elytra; legs pitchy black. L. 13–15 mm.

Cellars and outhouses; often found beneath dead leaves in sand-pits, or in the open country in hollows or under stones; generally distributed and common throughout England; Scotland, scarce, but distributed from north to south; Ireland, near Belfast and Dublin, and probably widely distributed.

SPHODRUS, Clairville.

This genus and the preceding are usually placed before *Calathus*, but they appear to come more fitly just before the species of *Anchomenus* with cordiform thorax, to one or two of which they bear a considerable superficial resemblance: as, however, they are true *Anchomenina*, it does not much matter where they are placed in the tribe as they show affinities in various directions to all the other genera. The genus *Sphodrus* proper comprises only three species, one from Guinea, another from the Himalayas, and our own species, which is widely distributed in

Europe and the circum-Mediterranean countries: it is usually found in cellars and outhouses, especially those attached to bakers' premises.

The larva of *Pristonychus* is described and figured by Chapuis and Candèze, Cat. p. 36, Pl. i., Fig. 3; that of *Sphodrus* by Von Gernet, Horæ Ross, v., p. 12, Pl. i., Fig. 3. As Chapuis did not breed the perfect insect from his larva and found both *Sphodrus* and *Pristonychus* with it, and as Von Gernet found his larva with *Sphodrus* and *Blaps* only, and his description agrees with that of the larva described by Chapuis, it is probable that the latter really described the larva of *Sphodrus* as that of *Pristonychus*. The larva is elongate, rather depressed, covered with thick yellowish hairs which are more numerous on the lateral and posterior portions of the body; the colour is dull whitish yellow, except of the head and prothorax, which are smooth and of a dark reddish brown colour; the other corneous portions are of the same colour as the head and prothorax, but lighter; the head is as long as broad and almost as long as the prothorax, which is about as long as the meso- and meta-thorax together; the anal appendage is cylindrical, rather thick and short, and the cerci are moderately long and jointed.

S. leucophthalmus, L. One of our largest species of Carabidæ; head rather large, projecting, antennæ pitchy, first four joints black, third joint very long; thorax narrow, cordiform, strongly rounded in front and contracted behind, posterior angles sharp, prominent, dorsal furrow fine, sometimes distinct to base but abbreviated in front, base with a large depression on each side which extends upwards along the sides, side margins broad, reflexed; elytra oblong, opaque and dull, much broader than thorax, faintly striated, the striae very finely punctured; legs pitch-black. In the male the trochanters of the hind legs reach as far as the margins of the elytra, and are very sharp. L. 20-24 mm.

Widely distributed, but not common. London cellars; Sheerness, Greenwich, Walworth, Reigate, Deal; Repton and Burton-on-Trent; Norwich; Colchester; Swansea; Birkenhead; Lincoln; Scarborough and Halifax; Northumberland and Durham; Scotland, very rare, Solway; Ireland, very rare, Dublin, &c.

ANCHOMENUS, Erichson. (*Platynus*, Brullé.)

This genus comprises a large number of species (upwards of 300), which have a widely extended range throughout the globe; the great majority, however, are found in the northern hemisphere; as a rule they are brown or black, but some of the species are brilliantly metallic; they were divided by Bonelli into three sub-genera, *Platynus*, *Anchoromus*, and *Agonum*, according to the form of the thorax and elytra: the two former have the posterior angles of the thorax very sharp, whereas in *Agonum* they are very blunt and rounded; and again, *Anchoromus* has the elytra somewhat convex, and the shoulder angles projecting, whereas in *Platynus* the elytra are flat and the shoulders more rounded; in the latter genus, too, the apex of the elytra is more sinuate than in the former: these differences, however, are hardly enough to form separate genera upon, especially when we come to consider the intermediate forms, e.g. *A. livens*, &c., and so Brullé proposed the name of *Platynus* for the whole genus, which has been adopted by many authors; it is, however, better to retain the name *Anchoromus*, as Wiedemann pre-

occupied the name *Platyna* for a genus of Diptera. The *Anchomeni* are found in all sorts of localities, both damp and dry, under stones, refuse, moss, &c., in cracks in the banks of streams, at the roots of grass and trees, under bark, and occasionally on low herbage.

The larva of *Anchomenus marginatus* is figured by Schiödte, iii., Pl. xx., Fig. 11. It is white with the head dark fuscous, the antennæ and mouth ferruginous; the dorsal shields of the thorax are of the same colour as the head, those of the abdomen lighter with darker markings; the cerci are white with fuscous fasciæ, and fuscous at base: the shape of the larva is very much like that of *Chlænus vestitus*; the head is broad and sulcate, and the prothorax large, subquadrate, somewhat narrowed in front with all the angles rounded; all the dorsal scuta are margined; the cerci are moderately long, nodose; the muscular impressions of the abdominal dorsal scuta are well marked; the legs are short and the claws nearly equal. The larva of *A. angusticollis* closely resembles that just described, but differs in having longer and more slender cerci.

I. Antennæ with three basal joints glabrous.

i. Thorax cordiform with posterior angles projecting.

1. Thorax with broad concave border; apex of elytra strongly sinuate; length 10-11 mm. *A. ANGUSTICOLLIS, F.*

2. Thorax with narrow border; apex of elytra not strongly sinuate; length 6-8 mm.

A. Striæ of elytra impunctate *A. ALBIPES, F.*

B. Striæ of elytra strongly punctured *A. OBLONGUS, F.*

ii. Thorax not cordiform, posterior angles blunt or rounded.

1. Forehead with a broad shallow transverse depression just in front of eyes *A. LIVENS, Gyll.*

2. Forehead without depression.

A. Colour metallic, bronze, coppery, greenish, or red, occasionally dark blue or blue-black.

a. Elytra with yellow margins *A. MARGINATUS, L.*

b. Elytra without yellow margins.

a*. Legs and antennæ entirely black.

a†. Striæ of elytra distinctly punctured; third interstice with five or six pores.

a‡. Thorax almost circular, bright metallic green, elytra brilliant coppery red *A. SEXPUNCTATUS, L.*

b‡. Thorax with sides contracted behind, concolorous with elytra *A. ERICETI, Panz.*

b†. Striæ of elytra impunctate or almost imperceptibly punctured; third interstice with three pores *A. SAHLBERGI, Chaud.*

b*. Tibiæ reddish, antennæ with first joint red, at least on underside; striæ of elytra impunctate or almost imperceptibly punctured.

a†. Form broader; sides of thorax hardly raised towards base; posterior angles rounded *A. PARUMPUNCTATUS, F.*

b†. Form narrower; sides of

- thorax strongly raised towards base; posterior angles obtuse but plain A. GRACILIPES, *Dofl.*
- B. Colour black or black with a very slight metallic lustre.
- a. Concave border of thorax narrow A. ATRATUS, *Dofl.*
- b. Concave border of thorax broad.
- a*. First and second joints of posterior tarsi dull with a strong keel on their upper side; striae strong, interstices convex A. VIDUUS, *Panz.*, v. *mutus*, *Duf.*
- b*. First and second joints of posterior tarsi shining, simply convex; striae weaker, interstices flat A. VERSUTUS, *Gyll.*
- II. Antennae with first two joints and lower part only of the third joint glabrous; upper part of third joint and the remaining joints strongly pubescent.
- i. Thorax cordiform; head and thorax green; elytra yellow with green, or greenish blue markings A. DORSALIS, *Müll.*
- ii. Thorax not cordiform; head and thorax black or pitchy.
1. Thorax not longer than broad.
- A. Concave margin of thorax strong, especially at base; elytra with slight greenish metallic reflection.
- a. Thorax slightly broader in front than behind A. MICANS, *Nic.*
- b. Thorax considerably broader in front than behind A. SCHULUS, *Dofl.*
- B. Concave margin of elytra rather narrow; elytra without metallic reflection.
- a. Basal margin of elytra slightly sinuate; shoulders slightly projecting; posterior angles of thorax rounded but traceable A. FULIGINOSUS, *Panz.*
- b. Basal margin of elytra strongly sinuate; shoulders distinctly projecting.
- a*. Elytra and legs black; posterior angles of thorax completely rounded A. GRACILIS, *Gyll.*
- b*. Elytra and legs lighter or darker pitchy brown; posterior angles of thorax rounded but traceable A. PICEUS, *L.*
2. Thorax plainly longer than broad.
- A. Elytra lighter or darker reddish brown, sides nearly parallel; striae weaker A. THOREAL, *Dofl.*
- B. Elytra pitch-black, sides slightly rounded; striae stronger A. FURFUS, *Dofl.*

Group I. (Sub-Gen. **Platynus**, Bonelli.)

A. angusticollis, F. (*a.-similis*, Payk., *junceus*, Scop.). Black, shining; antennae and palpi pitchy; thorax narrow, cordiform, rounded in front, and rather strongly narrowed behind, with posterior angles

sharp, projecting, disc convex, transversely wrinkled, side margins broad and reflexed, dorsal furrow deep, terminating in front in a deep depression, base with a strong deep fovea on either side; elytra oval, much broader than thorax, broadest behind middle, with sides sinuated rather strongly before apex, deeply striated, the striae obsoletely crenulate or punctured, interstices convex, the third furnished with three pores; legs pitch-black or brown, tarsi usually lighter: the largest species of the genus that we possess. L. 10–11 mm.

At roots of trees, under loose bark, &c., common and widely distributed throughout the country; Scotland, common, Lowlands.

Group II. (Sub-Gen. **Clibanarius**, Gozis.)

A. dorsalis, Müll. (*prasinus*, Thunb.). Head and thorax green, elytra testaceous with a large common blue-black or greenish-blue patch extending from above the middle to apex, leaving the margins broadly testaceous; head large, antennae pitchy with base reddish testaceous; thorax longer than broad, contracted behind, and feebly cordiform, posterior angles nearly right angles, slightly raised, dorsal furrow more or less abbreviated in front and behind, base with a large deep longitudinal fovea on each side; elytra oblong-ovate, moderately striated, the striae feebly punctured, with three more or less obscure pores on the third interstice; underside black, sometimes greenish; legs pale red. L. 6–7 mm.

Common and widely distributed throughout the kingdom; found under stones, at roots of plants and trees, and in various situations.

Group III. (Sub-Gen. **Anchomenus**, Bonelli.)

A. albipes, F. (*pallipes*, Dej.). Pitchy black, winged; antennae and palpi pale or reddish testaceous; thorax cordiform, posterior angles small and acute, projecting, dorsal furrow abbreviated in front and behind, base coarsely punctured; elytra broad, ovate, shoulders round, striae impunctate, third interstice with three pores; legs pale testaceous. L. 6–8 mm.

Abundant in damp situations throughout the kingdom, and in fact throughout the whole of Europe with the exception of Eastern Russia; often common on the coast a little above high-water mark, as well as inland.

Immature specimens of this species are often of a pronounced red colour, and sometimes cause disappointment to collectors who think at first sight that they have found a good species.

A. oblongus, Sturm. Light pitchy, head and thorax darker, apterous; antennae and palpi pale or reddish testaceous; thorax long, narrow, scarcely wider than head, considerably contracted behind, posterior angles prominent, dorsal furrow distinct, strongly punctured at base, plainly, but not so strongly, in front; elytra oblong-ovate, convex,

widest behind, deeply striated, the striae very strongly punctured; legs pale testaceous. L. 5 mm.

Marshy places; local, but widely distributed and not uncommon, especially in the midland and southern districts of England; also occurs in Yorkshire and in the Northumberland and Durham districts, but is not recorded from Scotland; Ireland near Belfast, and rare near Dublin.

Group IV. (Sub-Gen. **Batenus**, Motschulsky.)

A. livens, Gyll. Pitchy black, head and thorax sometimes darker than elytra, rather elongate; antennae pitchy, base of joints lighter than apex; thorax oblong, cordiform, but gradually contracted to base and with the posterior angles rounded, margins reflexed especially at base, base with a deep fovea on each side, impunctate, dorsal furrow very distinct; elytra rather narrow and almost parallel-sided, although slightly widest behind middle, moderately striated, the striae finely and sometimes almost obsoletely punctured, third interstice with three or four pores; legs pitchy or reddish. L. 8-9 mm.

Damp and marshy places, inland and on the coast, rare; Kent (Westerham, Hythe, and Tonbridge Wells); Surrey (Ashstead); Shipley, near Horsham; Hastings; Dover; Tilgate Forest; Holme Bush and also at Highgate at sugar, on trees.

Group V. (Sub-Gen. **Agonum**, Bonelli.)

A. marginatus, L. Bronze green or coppery, sometimes purplish, with lateral margins of thorax narrowly, and all the margins of the elytra broadly, yellow testaceous; antennae pitch-black, with lighter base; thorax short, sides regularly rounded from apex to base, as broad in front as behind, anterior angles rather prominent, posterior angles rounded, disc convex much wrinkled transversely, dorsal furrow fine, base with a large shallow depression on each side near posterior angles; elytra broad, shoulders rather prominent, sides somewhat parallel, finely striated, the striae very finely but distinctly punctured, third interstice with three large pores; femora and tarsi pitch-black, tibiae, except base, testaceous. L. 8-9 mm.

Marshy places, banks of rivers, &c.; very common throughout the southern and midland parts of England; it becomes more local, however, towards the north, and in Scotland has not yet been recorded except from the Forth, Solway, and Clyde districts, in which it is local; Ireland, near Dublin, but not recorded in Haliday's Belfast list; it appears to range over the whole of Europe.

A. sexpunctatus, L. Head and thorax brilliant metallic green, the margins of the latter brassy, elytra brilliant coppery red, very shining, with scutellum and margins green; antennae and palpi black; thorax broad with sides strongly and evenly rounded, margins reflexed especially at base, disc transversely wrinkled, dorsal furrow distinct, base with a rather deep fovea on each side near posterior margin, very rugose and punctured, posterior angles rounded; elytra with the striae very distinctly punctured, interstices somewhat shagreened, third interstice

with six large pores (varying occasionally from five to eight); legs black, more or less metallic. L. 7-9 mm.

Damp places, especially on heaths; not common, although it used to be taken rather plentifully on Wimbledon Common and in other localities; Woking; Dorking; Battersea; Weston, Oxfordshire; Newark, Notts (near Stapleford Common); Epping Forest; Hertford; Swansea; Glanville's Wotton; it has also been doubtfully recorded from Yorkshire.

This species is said by Schaum and Dawson to vary considerably in colour, being sometimes unicolorous green or violet or even blackish. I have seen no British specimens representing these extreme varieties, although it is not uncommon to find specimens with the colour of the elytra duller red, and the thorax brassy green.

A. ericeti, Panz. (*fulgens*, Daws.). Smaller than the preceding, and narrower, also less shining; rosy copper, tinged with a purple or green shade, sometimes entirely purplish or blackish; antennae and palpi black; thorax with sides rounded in front and moderately but plainly narrowed from middle to base, posterior angles very obtuse, but visible, reflexed; disc very convex, margins rather broadly reflexed, dorsal furrow distinct, base with a large deep very rugose fovea on each side near posterior angles; elytra usually more shining metallic than the head and thorax, with plainly punctured striae, with six (occasionally more or less) pores on the third interstice. L. 6 mm.

On high moors and mountain districts in heathy localities; local, but not uncommon where it is found; Yorkshire Moors, near Halifax, and other places in the county; Northumberland and Durham district, Muckle Moss. Scotland local, both Lowlands and Highlands, Paisley, Glasgow district, Rannoch, &c.

A. Sahlbergi, Chaud. Upper surface of an unicolorous bronze-coppery colour; underside black, with a slight greenish metallic reflection; head moderately large, with two impressions in front of eyes, vertex smooth; antennae rather long, entirely black; thorax subquadrate, with sides not strongly rounded, slightly contracted to base, anterior angles marked, posterior angles very blunt, almost completely rounded, with central furrow distinct, meeting a transverse furrow in front, and a small but plain and rather deep round or oblong depression a little before base; the usual depressions near posterior angles are well marked; elytra of female considerably widened behind, and narrower towards base, of male more parallel-sided, with fine striae and broad flat interstices, which are extremely finely shagreened; third interstice with three pores; legs deep black. L. $7\frac{1}{2}$ - $8\frac{1}{4}$ mm.

This interesting addition to our indigenous Coleoptera was lately introduced by me (Ent. Mo. Mag. xxii. 265) on the authority of three specimens (one male and two females) in Dr. Sharp's collection, taken by Mr. Henderson on the banks of the Clyde below Glasgow 20 years ago; Dr. Sharp believes that others were taken in the same locality; it has hitherto occurred in Eastern Siberia, and has not before been found in Europe.

From *A. ericeti* it differs by its colour, and the fine impunctate striae of the elytra; from *A. parumpunctatus* by its entirely black legs and antennae, and by the colour and shape of the thorax; and from *A. gracilipes* by the shape of the thorax and the fact that it has only three pores on the third interstice of the elytra, a character that also separates it from *A. ericeti*.

A. parumpunctatus, F. (*laris*, Müll., *Mülleri*, Herbst.). Head and thorax usually greenish bronze, elytra brownish bronze; occasionally, however, in northern and mountainous districts specimens are found which are quite dark, almost black, and it commonly varies as regards the shades of colour on thorax and elytra, being more or less obscurely green, coppery, or brassy; antennae black, underside of first joint red; thorax with sides evenly rounded, posterior angles rounded, margins rather strong, reflexed, dorsal furrow plain, base with a deep slightly rugose fovea on each side; elytra finely striated, the striae very obsoletely punctured, almost smooth, third interstice with three or four pores; femora black, often metallic, tibiae testaceous or brownish, tarsi lighter or darker pitchy. L. 6–8 mm.

Damp and marshy places; common and widely distributed throughout the kingdom.

A. gracilipes, Duft. (*elongatus*, Dej.). Much narrower than the preceding; upper side reddish bronze or brassy, with a coppery reflection; first joint of antennae reddish, the rest pitchy; thorax somewhat broader than long, gradually rounded in front, slightly narrowed behind, margins strongly reflexed towards base, posterior angles blunt, but plainly visible, base with a depression on each side which is finely rugose; elytra long, rather parallel-sided; striae distinct, impunctate, third interstice with four to five, or sometimes six pores; femora black, metallic, tibiae and tarsi reddish. This species differs from the preceding in its narrow form, plain, though blunt angles of thorax, and more strongly raised hind margins of thorax. L. 7–8 mm.

Very rare; only a few specimens have been taken in England; Wisbeach Canal, Lowestoft, 1831 (Kuper); Southwold, Suffolk, 1859 (Brewer); Hornsea, Yorkshire, 1858 (Bissill); the latter specimen, however, is very doubtful, as it was lost soon after it was captured, before it had really been identified; it has also been taken at Lowestoft by Mr. E. Saunders. Its usual habitat on the Continent appears to be in woods under moss.

A. atratus, Duft. (*pusillus*, Dahl.). Deep black shining; antennae and palpi pitchy, base of the former lighter, often reddish; thorax with sides evenly rounded, posterior angles rounded but visible, side margins narrow, base with a rather small, slightly rugose fovea on each side near angles, disc convex, dorsal furrow distinct; elytra oblong-ovate with well marked very finely almost imperceptibly punctured striae; legs pitchy; very like the v. *maius* of *A. rubens*, but distinguished by its smaller size, and less rounded posterior angle of thorax, of which the margins

are much narrower; the basal foveæ are also considerably smaller. L. 7 mm.

Marshy places, river banks, &c.; widely distributed, but rather local; commoner in the southern and midland districts of England than in the north; Scotland, Lowlands, very local near the mouths of tidal rivers, Solway district; abundant on the banks of the Nith below Dumfries; I can find no record from Ireland.

A. viduus, Panz. Black, with a distinct greenish or brownish bronze reflection, especially on the elytra; antennæ and palpi black; thorax broader than long with sides evenly rounded, margins reflexed especially at posterior angles which are more plainly rounded than in the preceding species, dorsal furrow distinct, basal angles with a large somewhat deeply impressed slightly rugose fovea; elytra more parallel-sided in the male than in the female, deeply striated, the striae feebly punctured, interstices convex, the third with three pores; legs black. L. 8-9 mm.

Marshy places, at roots of grass and trees, not uncommon; Lee, Darent Wood, Wimbledon, Weybridge; Reigate; Deal; Bournemouth; Repton and Barton-on-Trent; Gumley, Market Harborough; Bewdley; Colchester; Liverpool; Yorkshire; Newcastle-on-Tyne. Scotland not common, Clyde and Moray districts. Ireland, near Belfast (perhaps the *v. mæstus*).

V. mæstus, Duft. Smaller than the type, with rather narrower thorax, and perfectly black without any metallic reflection; it has been regarded as a separate species, but there is no real structural difference. Commoner than the type form, but very often taken in company with it: it is not common in Scotland, but, unlike the type, occurs in the Forth and Solway, as well as the Clyde districts, and is not found in the Moray district.

A. versutus, Gyll. Very like *A. viduus*, but smaller, and easily distinguished by the much finer striae and flat interstices of the elytra, and also by its considerably shorter and more transverse thorax, which is fully as broad behind as in front, whereas in *A. viduus* it is distinctly narrower behind; it is also a more shining insect; the first and second joints of the posterior tarsi are shining and simply convex, whereas in *A. viduus* they are dull and are furnished with a strong keel on their upper side. L. 7-7½ mm.

Marshy places, at roots of grass, &c., rather rare; Wimbledon, Battersea, Lee; Yaxley Fen; Shipley; Repton; Tonbridge. Scotland, Eccles (two specimens in Dr. Sharp's collection); Dollar (A. Beaumont).

Group VI. (Sub-Gen. **Europhilus**, Chaudoir.)

A. micans, Nic. Black with a brassy greenish reflection, shining; antennæ black with lighter base; thorax not quite as long as broad, narrowly margined, sides rounded, slightly narrowed behind, posterior angles rounded but visible, basal foveæ near angles deep, dorsal furrow distinct, abbreviated in front and behind; elytra rather broad, somewhat dilated behind middle, rather flat, finely striated, the striae impunctate,

interstices slightly convex; femora black, tibiæ and tarsi pitchy. L. $6-6\frac{1}{2}$ mm.

Marshy places, near banks of rivers and ponds; also under bark of fallen trees, by sweeping rushes, &c.; local but not uncommon and widely distributed throughout England. Scotland, very local, Tay and Solway districts. Ireland, near Dublin.

A. scitulus, Dej. Very shining, black, with a greenish tinge on the elytra, which is often hardly perceptible: it differs from *A. micans* in being smaller and narrower; the thorax is more obliquely sloped and narrowed behind, with smoother disc and deeper dorsal furrow; the elytra also are much narrower and more convex: in size and general appearance it resembles most closely *A. gracilis*, but besides the fact that the latter insect presents no trace of a greenish reflection, *A. scitulus* differs from it in being more shining, and in having the sides of the thorax more plainly rounded, with margins more reflexed at base and the basal foveæ deeper, and also in having the elytra more strongly striated. L. $5\frac{1}{2}-6$ mm.

Marshy places, at roots of grass, &c.; not common: Putney; Hammersmith; Lee; Repton; Bath; Forest of Deau. Not recorded from the north of England, Scotland, or Ireland.

A. fuliginosus, Panz. Black or pitchy black, elytra often pitch-brown; thorax as long as broad, somewhat narrowed behind, posterior angles rounded but traceable, dorsal line distinct, basal foveæ near angles smooth, basal margin about two-thirds as broad as anterior margin; elytra ovate with sides rounded, striated, the striae very feebly punctured; legs pitchy. L. $6-6\frac{1}{2}$ mm.

Damp and marshy places; common and widely distributed throughout the kingdom; not recorded from the extreme north of Scotland.

A. gracilis, Gyll. Smaller than the preceding, entirely black, with antennæ and legs also black; the thorax is wider in front and less contracted behind, and the posterior angles are completely rounded; the shoulders are more prominent, and the elytra are less strongly striated, with the sides more parallel: in general contour it approaches most nearly to *A. piceus*, but that species is plainly larger, and always has the elytra pitchy-brown, and also has the posterior angles of thorax less rounded, and the anterior and posterior margins of the latter nearly equal, whereas in *A. gracilis* the posterior margin is plainly the narrower. L. $5\frac{1}{2}-6$ mm.

Damp and marshy places; rather local, but widely distributed and not uncommon throughout the country. Scotland, common, Lowlands and Highlands. Ireland, not recorded, but it probably occurs.

A. piceus, L. (*picipes*, F.). Narrow and rather slender, pitch-black, the elytra and legs pitch-brown or testaceous brown; antennæ pitchy with reddish base; thorax about as long as broad, as broad in front as behind, posterior angles rounded but traceable, dorsal furrow distinct,

base with a deep smooth fovea on each side; elytra wider than the thorax, much narrower and more parallel than in *A. fuliginosus* or *micans*, shoulder-angles projecting, with very fine striæ; legs brownish testaceous. L. $6-6\frac{1}{2}$ mm.

Damp and marshy places; also under bark of fallen trees; local; rather rare in the London district; common in the Midlands; Yorkshire; Northumberland and Durham; Scotland, local, Lowlands; Ireland, near Belfast, Dublin, and Armagh.

Besides other points of distinction, the subquadrate thorax, which has the anterior and posterior margins almost equal in breadth, will serve at once to separate this species from all its allies: from *A. fuliginosus* it is also distinguished by its more slender form, and more parallel elytra, which are much more finely striated.

A. Thoreyi, Dej. Elongate; head and thorax pitchy, elytra brownish-yellow, or light pitchy brown, darker in the middle next suture; antennæ pitchy, base reddish; thorax with the margins often narrowly testaceous, with sides rounded in front and contracted behind, distinctly longer than broad, posterior angles rounded but visible, dorsal furrow distinct, base with a small, rather shallow fovea on each side near angles; elytra with sides nearly parallel, about twice the width of the base of thorax, finely striated; femora except apex red, tibiæ and tarsi brownish. L. 7 mm.

Marshy places beneath debris of reeds, &c.; local, but not uncommon; Kent; Brighton; Hastings; Walton-on-Naze; Burton-on-Trent; Coleshill; Sutton Park, Birmingham; Yorkshire; Cambridgeshire Fens; not recorded from the north of England, Scotland, or Ireland.

A. puellus, Dej. (*pelidnus*, Payk.). This species is so exceedingly closely related to the preceding that the one might with very good reason be considered a variety of the other; in fact it is most probable that this will eventually be the case: the only real difference seems to lie in the colour, which in *A. puellus* is always dark pitchy black; the elytra are said to have their sides rather more rounded than in *A. Thoreyi*, and to be more deeply striated (Daws., G. D. 94); on the other hand, Schaum (Insect. Deutsch. i. 428) says distinctly of *A. Thoreyi* that the striæ, especially the outer ones, are a little stronger than in *A. pelidnus* (ein wenig stärker als bei *pelidnus*): these differences, therefore, are evidently very small. L. 7 mm.

Marshy places, at roots, beneath debris of rushes, &c., also under bark of fallen trees near ponds, and in stems of *Typha latifolia*; local, but not uncommon; Hythe; Leicester; Bewdley; Burton-on-Trent; Repton, Crewes Pond; Coleshill; Sutton Park, Birmingham; Hornsea (Yorkshire); Scarborough; Liverpool; Scotland, very local, Lowlands, Forth district; Edinburgh; abundant about Duddingstone Loch.

(*A. quadripunctatus*, De G. (sub-gen. AGONUM). Smaller than any of the preceding; greenish æneous, or black with a greenish tinge; antennæ and palpi black; thorax double as broad as long, somewhat narrowed behind, with very blunt, somewhat elevated,

posterior angles, disc convex, depressed towards the sides, somewhat transversely wrinkled, dorsal furrow strong, base with an oblong fovea on each side near angles; elytra rather long, hardly widened behind the middle, finely striated, with four deep pores between the second and third striae, somewhat irregularly placed; legs black. L. 4-5 mm.

A single example was taken many years ago by Mr. T. J. Bold, at Long Benton, Newcastle-on-Tyne; it has not, however, occurred since, and requires further confirmation before it is finally admitted into our lists; it is placed by Schaum (Insect. Deutsch. i. 411) in the *A. hircus* section with that insect and *A. Bogemanni*; it appears to be rare in Central Europe, but common in Sweden, North Russia, and in Siberia.)

OLISTHOPUS, Dejean.

This genus comprises about twenty species, ranging from Madeira over Southern and Central Europe to the Caucasus, some being also found in the United States: it comes very close to *Anchomenus*.

O. rotundatus, Payk. Bronze or brassy brown, very shining; antennae and palpi reddish testaceous; thorax broad and short with sides very evenly rounded, posterior angles rounded, dorsal furrow distinct, base with a more or less punctured fovea on each side near angles; elytra oblong-ovate, rounded at sides, striae very finely punctured, interstices quite smooth and shining, third interstice with three large pores; legs pale yellow or reddish testaceous. L. 7-8 mm. .

Under stones, in moss, &c.; generally distributed and common throughout England; Scotland, not uncommon, Lowlands; Ireland, near Belfast, and sea coast near Dublin.

Sub-Div. v. **Bipalmati.**

The members of this group have the two first joints of the anterior tarsi dilated in the male, with the exception of certain species of *Tachys*, in which they are simple in both sexes; they are here taken as including both the *Trechina* and the *Bembidiina*, which latter tribe has by some authors been formed into a separate division; the members, however, of the two tribes are closely connected together in many ways, and, as Mr. Bates says (Biol. Cent. Am. Carabidae, vol. i. p. i. p. 136), "the genus *Orthozetus*, which belongs to the *Pogonus* group, connects in another direction the *Bembidiina* through the genus *Bracteon* (formed by M. Bedel to contain *B. paludosum* and its allies) with *Pogonus* and *Patrobis*." The dilated joints of the male tarsi are, as a rule, furnished with ragged squamæ beneath, but *Tachypus* has them plainly pilose; this character has been very much overlooked, or has not received the consideration which ought to have been given to it; not only does it establish beyond all doubt the generic value of *Tachypus*, which some authors would include under *Bembidinum*, but it carries the genus right back into close relation with the *Elaphini* (to which its resemblance has been supposed to be

merely superficial), and also, considering its close affinities with *Bembidium*, it takes with it all the Bembidiina as well, and gives another striking proof, if any were needed, of the utter impossibility of making anything like a linear classification of the Carabidæ.

The division may be subdivided as follows:—

- I. Palpi with a very short and slender terminal joint BEMBIDIINA.
- II. Palpi with a more or less long and tapering terminal joint TRECHINA.

BEMBIDIINA.

The members of this tribe may be at once distinguished from all the other Carabidæ by the very short and slender terminal joint of the palpi: this peculiarity of the palpi is also found in the Halipli, and it is for this reason, as well as for their semi-aquatic habitat, that the Bembidia have been placed at the end of the Carabidæ as a connecting link between the Geodephaga and the Hydradephaga. If, however, we allow questions of habitat to be taken into consideration, we might with quite as much, if not greater reason, place Omophron at the end of the Carabidæ: some authors would be inclined to include the Halipli with the Carabidæ, in which case they might be placed near *Bembidium*, but there is no need, according to our present arrangement, to force this latter genus from a more natural position, in order to bring it into juxtaposition with the Haliplidæ, so long as these are reckoned among the true Hydradephaga, of which they are best considered a separate family distinct from the Dytiscidæ. The aberrant North American genus *Amphizoa* would seem to form the best transition between the Carabidæ and Dytiscidæ, but of this we shall have to speak when we come to consider the latter family.

The genera may be thus divided:—

- I. Anterior tibiæ obliquely truncate externally at apex; sutural stria recurved at apex TACHYS, *Schaum*.
- II. Anterior tibiæ not obliquely truncate externally at apex; sutural stria not recurved at apex.
 - i. Penultimate joint of anterior tarsi armed with a curved spine beneath LYMNÆUM, *Steph.*
 - ii. Penultimate joint of anterior tarsi simple.
 - 1. Elytra not pubescent; striæ distinct; dilated joints of anterior male tarsi furnished with squamæ beneath.
 - A. Antennæ short, with joints 4-10 moniliform; sides of elytra parallel CILLENUS, *Sam.*
 - B. Antennæ long, with joints more or less elongate; sides of elytra more or less rounded BEMBIDIUM, *Latr.*
 - 2. Elytra pubescent; striæ indistinct; dilated joints of anterior male tarsi pubescent beneath; eyes very large . . . TACHYPUS, *Lac.*

TACHYS, Schaum.

This genus has been united by several authors with Bembidium, but was separated off by Schaum through the sculpture of the elytra and the obliquely truncate anterior tibiæ; it contains between a hundred and a hundred and fifty species which are widely distributed over the whole

surface of the globe, in the tropical as well as the temperate regions; they are amongst the smallest of the Carabidæ, and are found in moist places on the banks of streams running in the sun on the mud, also at roots of grass, or under stones and rubbish; the species that form Schaum's second group of the genus, and which were placed in a separate genus *Tachyta* by Kirby, are found under bark: we do not, however, possess any species from this section: of our five British species two (*T. quadrisignatus* and *T. parvulus*) depend at present on single specimens, and therefore require further confirmation; and a third (*T. Focki*) has only occurred in one locality, and has not been taken for many years. These small Carabidæ are likely to be imported with ballast, which ships take in from localities where they might be expected to occur, and then discharge in heaps in or near harbours in places where a few insects, imported in all stages probably, might easily found a small colony. No species of *Tachys* has been recorded as yet either from Scotland or Ireland.

The larva of *Tachys* (*Tachyta*) *nanus* is described and figured by Perris, Ann. Fr. 1862, 175, Fig. 510-516. It is linear and elongate, and clothed above and below with hairs of different lengths, as is usually the case in the Carabideous larvæ; the head is depressed, a little longer than broad, with two longitudinal furrows, testaceous with the anterior border darker; prothorax quadrate, reddish, meso- and meta-thorax light, abdominal segments whitish; cerci rather stout, not jointed, about a third longer than the anal appendage, which is rather long comparatively; claws equal. L. 4 mm. Apparently nothing is known of the larvæ of the ordinary species of *Tachys*, and it must be remembered, as said above, that *Tachyta nana* has been considered a distinct genus: all the larvæ, however, of this group, as a rule, bear a strong family resemblance to one another.

- I. Upper side more or less convex; thorax with posterior angles sharp; antennæ not much longer than head and thorax.
 - i. Form very convex; elytra short oval; upper surface entirely reddish testaceous *T. FOCKI*, Hum.
 - ii. Form moderately convex; elytra long oval.
 - 1. Elytra unicolorous black or pitchy *T. PARVULUS*, Dej.
 - 2. Elytra black with two well-defined yellow spots on each *T. QUADRISIGNATUS*, Duft.
- II. Upper side flat; thorax with posterior angles blunt; antennæ as long as half the body.
 - i. Thorax dark; elytra more or less testaceous *T. SCUTELLARIS*, Germ.
 - ii. Thorax and elytra unicolorous dark pitch-brown, almost black *T. BISTRIATUS*, Duft.

T. Focki, Hum. (*bisulcatus*, Nic., *latipennis*, Sturm). Upper surface entirely reddish testaceous; antennæ and legs lighter; head with two deep furrows on forehead, eyes black slightly prominent; thorax somewhat broader than long, subquadrate, very slightly contracted behind, posterior angles sharp right angles, dorsal furrow abbreviated in front and behind, base much depressed with a rather deep fovea on each side near angles; elytra ovate, convex, double as broad as thorax, with four punctured striae next suture, the first and second of which are strongly marked, the third and fourth shorter and weaker; the following striae

are almost obsolete, the eighth deep behind and obsolete in front, third interstice with two pores. L. $2-2\frac{1}{2}$ mm.

Taken first by Mr. Bold beneath stones on the sea shore near South Shields in the spring of 1863, and afterwards in some numbers by Mr. Crotch in the same locality, but it has not occurred, apparently, for many years; it is a rare species on the Continent.

***T. parvulus*, Dej.** Upper surface dark brown or reddish brown with a slight metallic lustre; antennæ rather short, brownish or brownish yellow, with the base yellow; forehead with two fine longitudinal lines on each side; prothorax subquadrate, slightly narrowed behind, strongly depressed at base, with posterior angles acute; elytra rather convex, with the sutural and three following striae strong, finely but distinctly punctured, reaching almost to base, evanescent before apex, except the first, which is recurved; a fifth stria is obscurely indicated, and the eighth is deep from base to apex; legs entirely yellow. L. $1\frac{1}{2}$ m.

A single specimen was taken in September, 1884, by Mr. J. H. Smedley at roots of *Parnassia palustris* from Wallasey Sand-hills, Liverpool (Ent. Mo. Mag. xxii. 43); no other, however, has yet been found in the locality.

This species is in the same section as *T. quadrisignatus*, from which it may be at once separated by its unicolorous elytra; from *T. bistratus* it may be distinguished by the acute posterior angles of the thorax as well as by the different sculpture of the elytra.

***T. quadrisignatus*, Duft. (*seestriatus*, var., Duft.).** Pitchy black, lighter or darker, with two round reddish yellow spots on each elytron; antennæ brownish, lighter at base; forehead with two longitudinal grooves on each side between eyes; thorax subquadrate broader than long, slightly narrowed behind, posterior angles acute, base depressed; elytra with three deeply impressed and punctured striae, rather faint at base, and still more so at apex, except the first which is recurved, fourth stria not so deep as the first three, the other striae more or less obsolete, except the eighth which is distinct at base and apex; legs testaceous, tibiae sometimes pitchy in middle. L. 2 mm.

This species is variable as to size and colour, being sometimes brownish or almost testaceous: a single specimen of one of these light forms was taken at South Shields by Mr. Bold, and is the only British example known. As Mr. Bold makes frequent allusions in his catalogue of the insects of Northumberland and Durham to the ballast heaps at South Shields, it is possible that this specimen was introduced as has above been suggested: it is also possible that *T. Focki* may have also been imported in the same way.

***T. scutellaris*, Germ.** Head and thorax pitchy brown, elytra livid testaceous with a triangular patch about scutellum fuscous, and the apex and more or less of the surface (sometimes the whole surface) clouded; antennæ brownish with the base testaceous (sometimes almost

entirely testaceous); thorax broader than long, considerably narrowed behind, posterior angles blunt but slightly elevated; elytra depressed, with sides almost parallel, striae very feeble, two or three near the suture plainer, sutural stria recurved, recurved portion very strongly impressed, each elytron with a pore near the middle; underside brown; legs testaceous, femora more or less dusky. L. 2 mm.

Very local, but sometimes plentiful where it occurs; Sheerness; Lyminster Salterns; Hastings district; Christchurch, Hants; Whitstable; usually found running in marshy and muddy places in the sunshine.

T. bistriatus, Duft. Pitchy brown, sometimes paler; antennae brownish with the base testaceous; thorax broader than long, narrowed behind, posterior angles obtuse but rather elevated and prominent, base depressed; elytra depressed, with two distinct striae next suture, the sutural stria recurved, the recurved portion strongly impressed, the exterior striae more or less obsolete, sides and apex smooth, fourth interstice with a pore on anterior third; legs testaceous. L. $1\frac{1}{2}$ mm.

Sandy banks of rivers, &c.; also in muddy places near the coast; running in the sunshine, or at roots of grass, under stones, &c.; locally plentiful: Maidstone; Mickleham; Cowfold, near Horsham; Holme Bush, near Brighton; Bristol Channel; Tonbridge; Weymouth; Hastings; Luccombe Chine, &c., Isle of Wight; a single specimen is recorded by Bold from South Shields (which may however belong to the preceding species, as he mentions it as synonymous with *T. scutellaris*, l. c. p. 13).

LYMNÆUM, Stephens.

This genus is included by some authors under *Bembidium*; it contains six species, of which three are European, a third, from Toulon, having lately been added by M. Bedel; the other three are found respectively in the East Indies, California, and the Kurile Islands (near Japan).

L. nigropiceum, Marsh (*sulcatulum*, Chaud.). Pitchy or ferruginous, elongate, depressed, apterous; head large with two deep longitudinal frontal furrows; antennae long, ferruginous; thorax broader than head, cordiform, sides rounded in front, strongly contracted behind, posterior angles acute, dorsal furrow distinct, base with a deep fovea on each side; elytra somewhat parallel-sided, very deeply striated, outer striae punctured, inner ones impunctate, interstice between third and fourth stria with two large pores; legs red. L. 4 mm.

Local, but not uncommon where it occurs; under stones and shingle on the coast, often below high-water mark; Ventnor, rather common; Portsea; Whitstable; formerly supposed to occur only at Ventnor and in the Crimea, but it has occurred at Dieppe and the Ile de Ré in France.

CILLENUS, Samouelle.

This genus comprises only one species, which is easily distinguished from all its allies by its cylindrical form and short antennae; it is found under stones or refuse below high-water mark, and when the tide recedes may be found running in the sunshine; as a rule the wings are short

and rudimentary, but occasionally in warmer countries (e.g. Portugal) specimens are found with the wings fully developed: the larva is figured by Fairmaire, Ann. Fr. 1852, Pl. ii., Fig. 4; it is chiefly remarkable for the very large head, and mandibles, the latter being almost as long as the head and strongly toothed in middle; the legs and anal appendage are very short, and the cerci of moderate length.

C. lateralis, Sam. (*Leachii*, Dej.). Head and thorax bronze green or coppery, shining, elytra testaceous more or less clouded on sides; form elongate; head very large, eyes prominent, head with eyes as broad as thorax or nearly so, antennæ brownish or ferruginous with base testaceous; thorax cordiform, with anterior margin straight, sides rounded behind anterior angles, and strongly contracted to base, posterior angles acute, disc convex, dorsal furrow distinct, base depressed; elytra flat, parallel-sided, distinctly striated, third interstice with four pores; legs testaceous. L. $3\frac{1}{2}$ –4 mm.

Local, but plentiful where it occurs; Chesil Bank; Littlehampton; Sheppy; Pegwell Bay; Portland; Rye; Heacham near Hunstanton, Norfolk; shores of Mersey near Liverpool; Northumberland; Scotland, Firths of Forth and Clyde, also at Dumfries.

BEMBIDIUM, Latreille.

This genus comprises about 400 species, which are almost entirely confined to the cold and temperate regions of the northern hemisphere; very few species are found south of the equator, and these appear to come from the same regions, as a rule, as the South American Carabi, which are also very few in number, and have a peculiar facies of their own (e.g. *C. chilensis*, &c.); in fact as regards distribution the genera Carabus and Bembidium, almost the largest and smallest representatives of the Carabidae, appear to bear a striking resemblance to one another. The species of *Bembidium* are almost exclusively confined to damp and marshy localities, being found mostly on the banks of streams and rivers; although the perfect insect never appears voluntarily to take to the water, yet it will exist for a long time submerged, and many species show considerable agility in regaining dry land; the larva, however, must often exist for a long time under water, as the habitats of the *Bembidia* are, in many cases, covered with floods for a considerable period during the winter months; the species of the sub-genus *Oryz* are said to be found under bark of trees; as far as our species *B. rufescens* is concerned, I have certainly taken most of my specimens from under bark, but it was in winter from fallen trees at the side of a pond, which were full of *Anchomeni* and other hibernating beetles; *B. quinque-striatum* I have never found under bark; it appears rather to frequent moss. The third European species, *B. subtile*, appears to be now considered a variety of the latter species.

The genus comprises a large number of sub-genera (about twenty are mentioned in the last European catalogue), the species of which often run

very closely one into the other, and make the study of the group difficult unless they are more or less classed together, in which case they become a help instead of a hindrance. One of the most distinct of these sub-genera appears to be the genus *Bracteon*, Bedel, which has only recently been founded to include *B. paludosum* and its allies.

Thomson (Skand. Col. i. 196) describes a larva which he found living in company with *B. ustulatum*, and which he considers to belong to that species; it is yellowish, with head and thorax shining, of a horny consistence, abdominal segments leathery; head as long as broad, not narrower than thorax; antennæ four-jointed; mandibles strong, sickle-shaped, with a sharp tooth before middle; thorax almost square as long as the meso- and meta-thorax together; abdomen narrower than thorax, last segment with two long, unjointed, uneven cerci furnished with several outstanding bristles; legs rather short, tarsi with single claws.

The larva of *B. bipunctatum*, L., is figured by Schödté, iii., Pl. xx., Fig. 17, and agrees with Thomson's description of the larva of *B. ustulatum* in many points: the head is strongly sulcate, and the clypeus serrate; the prothorax is subquadrate, rather transverse, with all the angles rounded; the cerci are about half as long again as the cylindrical anal appendage, and are curved inwards so that they almost meet at their extremity; the abdominal shields are not margined, and the muscular impressions are obsolete; the legs are rather short with single solid claws. The larva of *B. pallidipenne* differs from the two preceding by its much paler colour.

As there are nearly fifty species of this genus found in Britain (upwards of a sixth of the whole of the Carabidæ found in the country), and as they are mostly of very small size and many of them run very closely one into the other, they generally afford great difficulty to students: besides the usual tables, I have therefore added a summary depending entirely on colour, without reference to other distinctions, as a help to beginners, and I hope that the difficulties may thus be in some degree lessened.

- I. Anterior margin of thorax almost straight; apex of metasternum bordered between intermediate coxæ.
 - i. Striæ of elytra much feebler at sides, often evanescent, seventh stria at least almost always effaced behind or absent.
 1. Thorax not cordiform, with sides rounded regularly from apex to posterior angles.
 - A. Posterior angles of thorax with a depression not bounded by a longitudinal fold; third interstice of elytra with one piliferous pore behind middle; antennæ red.

Group I. (**Ocys**, Steph.)

B. rufescens, *quinquestriatum*.

- B. Posterior angles of thorax with a deep depression bounded by a longitudinal fold; third interstice of elytra with two piliferous pores; antennæ brownish with lighter base.

Group II. (**Philocthus**, Steph.)

B. obtusum, *biguttatum*, *riparium*, *senum*, *guttula*, *Mannerheimi*.

2. Thorax narrowed behind, strongly cordiform, posterior angles acute.

A. Frontal furrows plain and distinct near the interior border of the eyes.

a. Frontal furrows double.

Group III. (**Campa**, Mots.)*B. fumigatum, assimile, Clarki.*

b. Frontal furrows single.

a*. Frontal furrows very deep, meeting or almost meeting together and forming a V with the point towards the mouth.

Group IV. (**Lopha**, Megerle, pars.)*B. articulatum, Sturmi, doris.*

b*. Frontal furrows not very deep or regular, parallel, or only slightly convergent.

a†. Elytra unicolorous.

a†. Length not exceeding 3 mm.

Group V. (**Leja**, Megerle.)*B. lampros, nigricorne, gilripes, Schüppeli, normannum, pusillum.*

b†. Length not less than 4½ mm.

Group VI. (**Peryphus**, Megerle, pars.)*B. tibiale, atrocæruleum, decorum, monticola, nitidulum, affine, stomoides.*

b†. Elytra with light yellow or orange markings.

Group VII. (**Lopha**, Meg. pars, **Peryphus**, Meg. pars.)*B. quadrimaculatum, quadripustulatum, quadriguttatum, testaceum, saxatile, anglicanum, femoratum, bruxellense, concinnum, littorale, fluviale, lunatum.*

B. Frontal furrows obsolete, forehead and anterior angles of thorax punctured.

Group VIII. (**Notaphus**, Steph. pars.)*B. bipunctatum, pallidipenne.*

ii. Striæ of elytra complete, all entire, distinct to apex.

Group IX. (**Notaphus**, Steph. pars.)*B. flammulatum, varium, adustum, obliquum, ephippium, prasinum, punctulatum.*

II Anterior margin of thorax with lateral angles projecting; apex of metasternum not bordered between intermediate coxæ.

Group X. (**Bracteon**, Bedel.)*B. paludosum.*

The species may be divided as follows with regard to their colour: it must be remembered, however, that, although the colour is very constant as a rule, yet there is occasionally a slight variation owing to immaturity, some of the usually immaculate species showing traces of indistinct lighter patches at apex of elytra, if slightly immature.

1. Coppery, with dull impressed patches on elytra: *B. paludosum*.2. Bronze, unicolorous: *B. punctulatum, bipunctatum* (comparatively dull); *B. lampros, nigricorne* (very shiny).

3. Blue, or greenish, or black, unicolorous (larger species): *B. decorum*, *monticola*, *affine*, *nitidulum*, *quinquestriatum*, *stomoides* (with light legs); * *B. tibiale*, *atrocaruleum*, *prasinum* (with black legs or black with lighter tibiae and tarsi).

4. Dark blue or black, unicolorous (very small species): *B. pusillum*, *normanum*, *Schäppeli*, *gilvipes*, *Mannerheimi*.

5. Dark blue or black with yellow spot near apex of elytra (very small species): *B. guttula*, *assimile*, *Clarki*, *doris*.

6. Dark blue with distinct yellow spot near apex of elytra (larger species): *B. biguttatum*, *riparium*; or obscurely aneous, with spot visible but indistinct: *B. aneum*.

7. Elytra with four light yellow, straw-coloured, spots, two at shoulder and two towards apex: *B. quadrimaculatum* (very small), *B. quadripustulatum* (intermediate), *B. quadriguttatum* (larger).

8. Elytra with four orange spots or patches, two at shoulder and two at apex (sometimes confluent): *B. saxatile*, *femoratum*, *anglicanum*, *bruxellense*, *concinnum*, *littorale*, *fluviale*, *testaceum* (in the last species the markings are often indistinct and suffused).

9. Elytra with two distinct crescent-shaped patches at apex, and no other markings (one of the largest species): *B. lunatum*.

10. Elytra testaceous either with distinct dark markings across middle: *B. pallidipenne*; or with more or less suffused and indistinct dark markings towards sides and apex: *B. ephippium*.

11. Elytra with irregular yellow or testaceous markings on a dark ground: *B. articulatum*, *Sturmi*, *fumigatum*, *adustum*, *obliquum* (small species); *B. flammulatum*, *varium* (larger species).

12. Elytra brown or reddish brown, thorax rufous: *B. rufescens*.

Group I. (**Ocys**, Stephens.)

1. Elytra brown or reddish brown, thorax rufous

(sometimes concolorous with elytra); lateral border of thorax widened

B. RUFESCENS, Guér.

2. Upper surface entirely of a metallic blue colour;

lateral border of thorax not widened

B. QUINQUESTRIATUM, Gyll.

B. rufescens, Guér. (*unilaticornis*, Steph., *tempestivus*, Steph., *harpaloides*, Serv.). Colour as above, occasionally unicolorous reddish-brown; antennae and palpi testaceous; thorax short, transverse, about as wide behind as in front, broadly margined, dorsal furrow distinct, posterior angles acute, somewhat projecting, with depressions at angles but without longitudinal fold; elytra oval, rather convex, with plain punctured striae on disc, the apex and sides smooth; third interstria with one pore; legs testaceous. L. 4-5 mm.

Marshy places, at roots of grass, &c., also hibernating under bark. Rather local, but widely distributed, and common where it occurs. Scotland, local, Lowlands, Forth, Solway, Clyde. Ireland local, and not so common as in England.

B. quinquestriatum, Gyll. (*curvus*, Steph.). Upper side bluish or dark metallic green; antennae and palpi reddish testaceous, penultimate joint of the latter dusky; thorax shaped much as in the preceding species, except that the margins are not so wide, nor the posterior angles so acute; elytra oblong-ovate, disc with plainly punctured striae, the two next the suture entire, the three next abbreviated, the rest rudimentary or nearly

* In *B. nitidulum* and often in *B. affine* the femora are more or less dusky, but never entirely deep black as in *B. tibiale*.

obliterated, apex and sides smooth, third interstice with a pore behind; underside brownish black or reddish, legs reddish testaceous. L. 4 mm.

Sandy places, at roots of grass, and under moss; found also running in the sun on walls, &c.; London district, not common; Hastings; Deal; Tonbridge; Brighton; Isle of Wight; Liverpool (common at West Derby); Repton, Burton-on-Trent, and other midland localities; Lincolnshire; Yorkshire; Northumberland; Scotland, local, Glasgow, Kircaldy, Orkney Islands; Ireland, near Belfast and banks of the Dodder. It has been taken by Mr. T. Wood at Ramsgate in the burrows of sand-hoppers.

Group II. (*Philocthus*, Stephens.)

I. Thorax with posterior margin almost straight from one angle to the other.

i. Thorax distinctly more rounded in front than behind B. *OBTUSUM*, Sturm.

ii. Thorax evenly rounded in front and behind.

1. Thorax at widest distinctly narrower than elytra;

subapical elytral spot plain B. *GUTTULA*, F.

2. Thorax at widest as broad as elytra; subapical

elytral spot absent B. *MANNERHEIMI*, Sahlb.

II. Thorax with central portion of base projecting, emarginate between this and the posterior angles.

i. Legs and first joint of antennæ pitchy brown or reddish; elytral spot well marked.

1. 7th stria of elytra marked by a series of punctures B. *BIGUTTATUM*, F.

2. 7th stria of elytra absent, not indicated . . . B. *RIPARIUM*, Ol.

ii. Legs and antennæ black; elytral spot indistinct. . . B. *ÆNEUM*, Germ.

B. obtusum, Sturm (*Tachys obtusus*, Steph.). Black, with a very slight brassy or greenish reflection; antennæ brownish with the base testaceous; thorax transverse, convex, with sides rounded in front, broadest before middle, scarcely contracted behind, posterior angles blunt, dorsal furrow slender, base with a deep fovea on either side; elytra long oval, one and a half times as long as the base of thorax, one or two striae reaching apex, the outer ones finer, becoming gradually obsolete; legs red, femora generally pitchy. L. $2\frac{1}{2}$ mm.

Common and widely distributed as far north as the Tay district of Scotland, also in Ireland.

B. guttula, F. (*bisignatum*, Serv.). Shining bluish black, with a slight metallic reflection; antennæ brown, first joint red; thorax short, transverse, rounded at the sides, posterior angles obtuse but evident, dorsal furrow fine, basal foveæ large and deep; elytra rather long oval, broader than thorax, with strongly punctured striae on disc, becoming gradually finer and more obsolete towards sides, exterior margin with a round reddish or testaceous spot a little before apex; legs reddish testaceous. L. 3 mm.

One of the commonest and most abundant of British beetles: it is generally distributed over almost the whole of Europe.

B. Mannerheimi, Sahl. (*haemorrhoum*, Steph.). Very like the preceding, but black without any bluish tinge or metallic reflection, and without the reddish spot on the elytra, which are at most slightly paler at the extreme apex; the thorax is broader than in *B. guttula*, and more strongly rounded at the sides; the elytra are shorter oval, with the sides

more rounded, and the legs are paler, being of a bright reddish-yellow colour. L. 3 mm.

Marshy places, especially on heaths, at roots of grass, &c.; local, but often common where it occurs. Dartford, Maidstone, Wimbledon, Esher, Weybridge, Darenth; Tonbridge; Lancashire; Gosforth; also found in the Midlands; Scotland, common Lowlands, and has been found as far north as Tain, Ross-shire; Ireland, near Armagh.

B. biguttatum, F. Bluish black, occasionally with a greenish or purplish tinge; larger, more shiny, and with the elytral spot plainer than in *B. guttula*, which it closely resembles: from larger specimens of the latter species it is difficult sometimes at first sight to distinguish small specimens of *B. biguttatum*; as a rule, the latter insect may be at once distinguished by its size, but it differs further by having the sides of the thorax more strongly rounded, the posterior angles less evident, and the central portion of the base of thorax plainly produced, so that there is a much more distinct emargination between the posterior angles and the produced portion. L. 3-4 mm.

Common and widely distributed throughout England; Scotland, Lowlands, Tweed, Forth, and Clyde; Ireland.

B. riparium, Ol. (*lunulatum*, Fourc.). Very like the preceding, of which it may very probably be, as it has been considered by many authors, merely a variety; it differs, however, in being as a rule larger, in its colour, which is bronze black with the legs and base of antennæ reddish brown instead of testaceous, and in the fact that the seventh stria of the elytra is altogether wanting. L. $3\frac{1}{2}$ - $4\frac{1}{2}$ mm.

Not nearly as common as the preceding, but appears to be widely distributed, and to occur in company with it; occasionally, as in Plumstead Marshes, it seems to be the commoner of the two.

B. æneum, Germ. This species also has been considered a variety of *B. biguttatum* by Dejean and other authors, but whatever may be said of the preceding species, there can be no question that this one is distinct; its obscure bronze colour and quite black antennæ and legs will at once distinguish it from all the allied species; the thorax is shorter and more transverse than in *B. biguttatum*, and the posterior angles more evident; the elytra are narrower in front, the sides more rounded, and the disc has more finely punctured striae, which are less effaced towards apex: the elytral spot is present, but is almost always more or less obsolete, and in some cases is hardly visible. L. $3\frac{1}{2}$ mm.

On banks of rivers; also in brackish muddy places on or near the coast, under tidal refuse, stones, &c.; local, but widely distributed; not always common where it occurs, but sometimes abundant: for instance, it is found in great abundance on the banks of the Witham near Lincoln, but on the banks of the Trent at Repton I used to take it very sparingly. Scotland, local, Forth, Solway, Clyde. Ireland, near Belfast, local near Dublin, and near Armagh.

Group III. (**Campa**, Motschulsky.)

- I. Elytra with variegated yellow markings **B. FUMIGATUM**, Duft.
- II. Elytra unicolorous, with the exception of a more or less distinct subapical spot.

- i. Antennæ with the first three or four joints red *B. ASSIMILE*, Gyll.
 ii. Antennæ with the first joint only red *B. CLARKI*, Daws.

B. fumigatum, Duft. In general contour and appearance this species agrees very closely with the *N. ta. hys* group, and especially resembles *B. adustum*; it is, however, distinguished from all the members of that group by the double frontal furrows, and the fact that the striae of the elytra are evanescent at sides and apex; the head and thorax are obscure greenish bronze, elytra testaceous spotted or banded with black, or black with testaceous markings, as in *B. flammulatum*, &c.; antennæ fuscous with first two joints red; thorax transverse, with sides rounded in front and contracted behind, posterior angles sharp right angles, dorsal furrow distinct, base with a small deep fovea on each side; elytra ovate, first stria next suture reaching apex, the next abbreviated, the others still more so, or evanescent; legs testaceous. L. 3-4 mm.

Local, and not common, although occasionally plentiful where it occurs: formerly found at Noring Hill and in Hammersmith Marshes; Swansea; Alverstoke; Essex and Lincolnshire Fens; not recorded from the north of England, Scotland, or Ireland.

B. assimile, Gyll. (*S. p. p.*, Steph.). Bluish black or greenish; antennæ fuscous with three or four basal joints red; thorax a little broader than long, rounded in front, rather strongly contracted behind, somewhat convex, posterior angles right angles, dorsal furrow terminated in front and behind in a transverse depression, base with a deep but small fovea at each angle; elytra with a plain subapical spot and the apex itself testaceous, with strongly punctured striae on disc, becoming obsolete towards sides; legs testaceous or reddish. L. 3 mm.

Marshy places, amongst debris of reeds, &c.; local, but not uncommon; Gravesend, Sheerness, Chatham, Battersea; Reigate; Deal; Hythe; Isle of Wight; Slapton Ley, Devonshire; Harmsay, Yorks; Whittealea Mere; Lincolnshire and Cambridgeshire Fens; recorded from Ireland, but not from the north of England or Scotland.

B. Clarki, Daws. Rather larger than *B. assimile*, from which it is distinguished by its elytra being shorter in proportion, and by the much greater breadth of the thorax especially at base: it is also a brighter insect and darker coloured: the antennæ are pitchy with only the basal joint red; thorax with sides moderately rounded in front and not strongly narrowed behind, posterior angles right angles or slightly prominent, disc convex, base with a rather large fovea on each side; elytra rather convex, strongly striated, the striae next suture very deep, becoming more feeble towards sides, with a reddish testaceous subapical spot near margin (sometimes almost obsolete), and the apex itself often testaceous; legs entirely reddish testaceous. L. 3-3½ mm.

Marshy places, at roots of grass and in moss: local and not common; Lee, Strood, Wimbledon; Ramsgate; Thornton Reservoir, Leicestershire; Shipley, near Horslham; Dorchester; Colchester; Scotland, rare, Tweed district.

As Dawson, who first described the species, remarks (*G. Brit.* 199), in its general structure and in the deep striae and punctuation of the elytra, this species is allied both to *assimile* and *albipes*, but it is a more

robust insect, the thorax especially is larger and broader at the base, and the head is more deeply sulcated than in either; from *guttata*, which it somewhat resembles superficially, it is at once distinguished by the shape of the thorax.

Group IV. (**Lopha**, Megerle, pars.)

- I. Thorax strongly transverse; elytra with variegated yellow markings. **B. STURMI**, Panz.
- II. Thorax not strongly transverse.
 - i. Elytra with variegated testaceous markings **B. ARTICULATUM**, Panz.
 - ii. Elytra dark with plain yellow spot before apex . . . **B. DORIS**, Panz.

B. Sturmi, Panz. (*orbimaculatum*, Geze). Head and thorax shining bronze black, elytra black, or brownish black, with the apex, a subapical spot near margin, and several small longitudinal patches and spots towards base testaceous; antennæ brownish, first joint and base of the two following reddish yellow; frontal furrows very strong, converging, eyes prominent; thorax transverse with sides rounded in front and contracted behind, posterior angles sharp rather projecting, dorsal furrow fine, base with a fovea and also one or two large punctures on each side at angles; elytra oval, slightly convex, with strongly punctured striae, which are evanescent, all but one or two near suture, towards sides and apex; underside black, legs pale testaceous. L. 2-2½ mm.

This very distinct and pretty little species is one of the rarest of the British Carabidæ, although there seems no reason why it should not be found more plentifully, as it is by no means uncommon in France and central Europe: first taken by Dr. Power in Hammersmith Marshes, and afterwards also at Notting Hill, Beasted near Maidstone and Hythe (Gorham); near Westenhanger (Rye); Mickleham (one example on the banks of the river Mole, May 1875 (Champion); it has, I believe, been also taken at Dover.

B. articulatum, Panz. Head and thorax metallic green or bluish, elytra brownish yellow with a lighter band as a rule behind middle, with apex and irregular bands and markings fuscous or almost black; head large, eyes prominent, frontal furrows very strong meeting in front in rather a sharp point; antennæ fuscous with base testaceous; thorax rather long, convex, cordiform, with sides much rounded in front and contracted behind, posterior angles right angles with tip acute and elevated, dorsal furrow slight, base with a fovea on each side, and a row of large punctures between them; elytra almost double as broad as base of thorax, with strongly punctured striae, evanescent towards apex and sides, legs testaceous. L. 3 mm.

Sandy banks of ponds and rivers; generally distributed and common in the south and midland districts of England, but has not been recorded, as far as I can gather, from Yorkshire or the northern counties; the only Scotch record, "Ben Lomond, Dr. Leach" (Steph. Illust. ii. 22), is believed by Dr. Sharp (Scot. Nat. ii. 46) to be erroneous: it does not appear to have been recorded from Ireland.

B. doris, Panz. Metallic black, sometimes greenish or bluish; elytra with the apex and a subapical spot near margin testaceous; head large, eyes prominent, frontal furrows very strong, converging; antennæ fuscous with base red; thorax very convex, cordiform, shaped much as

in the preceding species, posterior angles sharp, projecting, dorsal furrow fine, base with a fovea on each side and also one or two large punctures between them and the central line; elytra rather convex, long oval, striæ rather finely punctured, evanescent towards apex and sides; legs reddish. L. 3 mm.

Sandy banks of ponds, &c.; also in salt marshes; very local, but occasionally common where it occurs. Cobham, Darent Wood, Strood, Wimbledon, Battersea, Horsell; Glanvilles Wooton; taken on the Till, Northumberland, by J. Hardy; Scotland, local, Tweed, Forth, Tay, Solway, Clyde, Moray; Ireland, near Belfast, and local near Dublin. I know of no record from Yorkshire or the Midlands.

Group V. (*Leja*, Megerle.)

I. Colour black (with or without a bluish or pitchy tinge).

i. Legs black or pitchy brown.

- | | |
|---|--------------------|
| 1. Thorax shorter and broader; antennæ and legs black | B. MINIMUM, F. |
| 2. Thorax longer and narrower; legs and base of antennæ brown | B. NORMANNUM, Dej. |

ii. Legs red, femora (at least underneath) pitchy; punctuation of elytra weaker

B. SCHÜPPELI, Dej.

iii. Legs entirely red; punctuation of elytra very strong

B. GILVIPES, Sturm.

II. Colour shining bronze.

i. First joint of antennæ red; thorax strongly contracted towards base

B. LAMPREOS, Herbst.

ii. First joint of antennæ black; thorax not strongly contracted towards base

B. NIGRICORNE, Gyll.

B. minimum, F. (*pusillum*, Gyll.). Black or black with a slight bluish tinge, shining, elytra unicolorous, with the apex occasionally lighter; head large, eyes rather prominent, frontal furrows parallel, antennæ black; thorax transverse, cordiform, with sides strongly rounded in front and contracted behind, posterior angles rather acute and projecting, dorsal furrow faint, basal foveæ small, base depressed and punctured; elytra long oval with seven strongly punctured striæ, entire at sides but evanescent towards apex; legs black (tibiæ occasionally with a slight brown tinge). L. $2\frac{1}{2}$ mm.

Wet muddy places on or near the coast; common and widely distributed in the south, more local in the north. Scotland, local, Forth, Solway. Ireland, near Belfast.

B. normannum, Dej. This species bears a rather close resemblance to the preceding, of which it has been considered a variety; it differs, however, by its evidently longer and narrower thorax, which is less rounded at the sides, and also by its colour which is more or less pitchy; the legs are brownish or pitchy; the apex of the elytra is occasionally lighter, and sometimes an obscure subapical patch is traceable, but there is no regular spot as in many other species. L. 3 mm.

Wet muddy places on or near the coast; local but not uncommon; often taken in company with the preceding in the southern and south-eastern districts of England.

B. Schüppeli, Dej. Obscure greenish or bluish black; antennæ fuscous with the base red; frontal furrows parallel behind converging

in front of the eyes; thorax short and broad, rather convex, with sides rounded from below the anterior angles to behind middle, and thence contracted, posterior angles right angles, dorsal furrow distinct, basal foveæ broad and rather deep; elytra oval, rather convex, with rather strongly punctured striae, which are carried (at all events the inner ones) nearly to apex; legs reddish-yellow, femora (at least on the under side) pitchy. L. $2\frac{1}{2}$ mm.

A northern species; first taken by Messrs. Bold and Murray on the banks of the Irthing, Cumberland, and afterwards in other localities in the district amongst grass on the margins of streams; in Scotland it is local in the Tweed, Solway, and Forth districts, and sometimes is found not uncommonly where it occurs.

This species comes nearest to *B. gilvipes*, but is distinguished by its broader thorax, which is less narrowed behind, by the darker femora, and especially the evidently less strong punctuation of the elytra.

B. gilvipes, Sturm (*Mammurheimi*, Dej., nec, Sahlb.). Black, shining; rather smaller than the preceding; antennæ blackish with base red; thorax convex, more narrowed behind than in *Schüppeli*, but otherwise much the same as in that species; elytra ovate, very convex, with sides evenly rounded, with very strongly punctured striae, becoming much finer towards sides, and evanescent at apex (except one or two inner ones); legs entirely reddish testaceous: the very strong sculpture of the disc of the elytra is the best distinguishing mark of this species. L. $2-2\frac{1}{2}$ mm.

Sandy and gravelly places on banks of rivers; often found in numbers in flood refuse. Local, but widely distributed throughout England; it occurs in the Northumberland and Durham district, but the only Scotch record, "Rachills, Rev. W. Little," appears somewhat doubtful.

B. lampros, Herbst. Brassy, very shining, rarely bluish or blackish; head with two deep parallel impressions between eyes; antennæ black with the first joint (and sometimes the second) red, at all events beneath; thorax with sides rounded in front and very strongly contracted behind, posterior angles right angles, sharp and somewhat projecting, dorsal furrow distinct, base with a deep furrow on each side, the space between punctured; elytra long oval, narrowed and rounded at shoulders, with six punctured striae distinctly marked, apex and sides smooth, or almost smooth; legs reddish brown or reddish, tibiae paler. L. $2\frac{1}{2}-3\frac{1}{2}$ mm.

Common and widely distributed throughout the kingdom; also over all Europe, and a great portion of Asia.

The *v. velox* (*B. 14-striatum*, Thoms.) is rather larger and has seven rows of punctures instead of six as in the type form; it is usually darker and duller, but is often coloured like the type; it is the *B. velox* of Erichson, and might perhaps be regarded as a separate species with as much right as *B. riparium*; it occurs not uncommonly with the type in England and Scotland, and probably in Ireland.

B. celere, Fabr. (*Tachypus celer*, Steph.), is a small variety of this species.

B. nigricorne, Gyll. Very like the preceding, but differs in having the first joint of the antennæ black, slightly brassy, and in the shape of the thorax, which is wide, very short, and very little constricted behind, appearing to be almost rounded in the middle at the sides as in *B. biguttatum*, &c.; elytra more convex, with sides more strongly rounded than in *lunipros*, not very strongly striate-punctate, seventh stria absent. Legs ferruginous red, slightly brownish on the thighs, which have a faint aeneous tint. L. $3-3\frac{1}{4}$ mm.

Sandy heaths, at roots of plants, &c.; a rare species; it was first taken by Mr. G. Wailes in the Newcastle district, and has since been found in some numbers at Chobham, Surrey, by Mr. Champion, Mr. Lewis and others; Cannock Chase (W. G. Blatch); Heswell Heath, Cheshire (R. Wilding); Thurstaston, Cheshire (J. Smedley); Liverpool (J. W. Ellis). It has not been recorded from Scotland, as far as I am aware, but it probably occurs in that country: until discovered in England it was only known to inhabit high European latitudes.

Group VI. (**Peryphus**, Megerle, pars.)

I. Femora entirely black.

- i. Anterior margin of thorax not much broader than posterior margin, size larger B. **TIBIALE**, Duft.
- ii. Anterior margin of thorax much broader than posterior margin, size smaller B. **ATROCERULEUM**, Steph.

II. Femora testaceous, at most darker at base.

- i. Thorax without longitudinal fold near posterior angles B. **DECORUM**, Panz.
- ii. Thorax with longitudinal fold near posterior angles.
 - 1. Thorax rather flat with sides contracted but not strongly rounded behind middle; penultimate joint of palpi dark.
 - A. Striæ of elytra strongly punctured towards base; femora with base broadly darker . . . B. **NITIDULUM**, Marsh.
 - B. Striæ of elytra less strongly punctured.
 - a. Antennæ with at least first three joints red; femora sometimes slightly darker towards base B. **AFFINE**, Steph.
 - b. Antennæ with first joint (and occasionally second) testaceous; legs entirely testaceous . . . B. **MONTICOLA**, Sturm.
 - 2. Thorax convex with sides strongly rounded behind middle; antennæ rather short and stout; palpi entirely yellow B. **STOMOIDES**, Dej.

B. tibiale, Duft. (*fasciolatum* var. *C.*, Duv.). Obscure brassy green or bluish, almost black, antennæ fuscous black with the first joint red; thorax not much broader in front than behind, with sides not much rounded from below anterior angles to behind middle, and from thence straight, posterior angles sharp, rather elevated, dorsal furrow distinct, base much depressed, with a large fovea on each side, the space between them striated longitudinally; elytra broad, depressed, with moderately strong distinctly punctured striæ, continued to apex; femora black, tibiae and tarsi testaceous. L. $4\frac{1}{2}-6$ mm.

Gravelly banks of rivers and streams; also damp sandy places near the coast; local but widely distributed; rare in the London district; Tonbridge; New Forest; banks of Trent and Dove, Repton, Burton-on-Trent; Bewdley; Church Stretton; Llangollen; Bridlington, Yorkshire; Northumberland and Durham; and many other localities. Scotland, abundant throughout the country; Ireland, near Dublin.

A large variety 7 mm. in length occurs in Charnwood Forest, Leicestershire, which may perhaps be referred to the type form *fasciolatum*, but in a large series so many gradations of form both of thorax and elytra are to be observed that it is almost impossible to separate the varieties satisfactorily; it is very probable that *B. atrocæruleum* and *B. tibiale* ought both to be considered varieties of the type, as they have been by many authors, and not separate species.

B. atrocæruleum, Steph. (*fasciolatum* var. B., Duv.). Very like *B. tibiale*, but smaller and narrower and usually of a brighter blue colour; the thorax is more contracted behind, so that the anterior margin is considerably broader than the posterior, and the hind angles are slightly more projecting; the elytra also are longer in proportion, and the striae are usually more slender and less strongly punctured. L. $3\frac{1}{2}$ –4 mm.

Widely distributed both in England and Scotland, and found under the same circumstances and in the same localities as the preceding, of which it is probably only a variety; Ireland, near Belfast, and probably to be found in many other districts; in its general appearance it is certainly very distinct.

B. decorum, Panz. More elongate and flatter than any of the following species of the group, and with more parallel-sided elytra; blue or bluish green, unicolorous; antennae dark with the first joint and base of the three following reddish yellow; thorax cordiform, nearly as long as broad, posterior angles right angles, somewhat prominent, dorsal furrow strong, basal foveæ wide, rugosely punctured, base with no trace of a longitudinal fold near the posterior angles (which is evident in the succeeding species); elytra elongate, depressed, almost parallel-sided, with strong punctured striae, evanescent towards sides and apex; legs red. L. 5–6 mm.

Gravelly places on the banks of rivers and streams; rare in the south of England, and in the London district (G. C. Champion); very common in the Midlands and the north (banks of Trent, Ouse, &c.); Scotland, abundant; Ireland, near Belfast and Dublin, and probably widely distributed.

B. nitidulum, Marsh (*brunneipes*, Sturm). Shining metallic green, sometimes bluish; antennae dark with the first joint and base of the three following (sometimes the first three entirely) red; head rather short, eyes somewhat prominent; thorax short, transverse, cordiform, posterior angles sharp right angles, dorsal furrow distinct, basal foveæ deep and large, base coarsely punctured; elytra oval, rather convex, with very strong coarsely punctured striae on disc, which become much feebler towards sides and apex; legs testaceous, femora more or less pitchy. L. 1–5 mm.

Damp sandy places in woods or open places and on the coast, common and widely

distributed in the south and Midlands; more local in the north. Scotland, rare, Lowlands, Tweed, Forth, Clyde.

B. affine, Steph. (*Stephensi*, Crotch, *nitidulum* var., H. R. W.). Considerably larger than the preceding species, which it otherwise very closely resembles: the head is more oblong, so that the eyes do not appear prominent; antennæ dark, first three joints, and often base of fourth, red; thorax longer with the sides less dilated in front and less abruptly narrowed behind; elytra much less strongly and coarsely punctured on disc; legs testaceous, femora slightly clouded at base. L. 6 mm.

Sandy and gravelly places inland and on the coast, local and not very common; Red Hill, Reigate, Woking, Charlton, Lewisham; Isle of Wight; Hastings district; Brighton; Southampton; Sutton Park, Birmingham; Repton; North Wales; Liverpool; Bridlington, Yorkshire; Northumberland and Durham; not recorded from Scotland or Ireland.

By some authors this species is considered a variety of the preceding, but it seems to be distinct.

B. monticola, Sturm (*nitidulum* var., H. R. W.). Bluish or greenish, metallic; antennæ with first joint clear testaceous, the second and base of the third often lighter than the rest which are dark; thorax rather small, sides very little rounded before middle, narrowed behind, posterior angles sharp, prominent, dorsal furrow distinct, basal foveæ deep; elytra long oval, rather convex, with somewhat finely punctured striae, becoming much feebler towards sides and apex; legs entirely pale testaceous. L. 5 mm.

This species is easily distinguished from *B. decorum* (with which I have taken it in company) by its more convex elytra which are more rounded at the sides, and rather differently punctured striae, and also by its lighter legs and less rounded sides of thorax; from *B. brunnipes* and *affine* it differs in the shape of the thorax, light femora, and in having only the basal joint of the antennæ testaceous.

Local and easily overlooked where it occurs, as it hides itself deeply in the crevices of sandy banks; it is also found in old stumps of willows, &c., near streams and rivers; banks of Dove, Burton-on-Trent; Sawley-on-Ribble; banks of Dee, Llangollen; Wallington; Bewdley; Draycott, near Derby; Liverpool district; North Yorkshire; Northumberland and Durham; Scotland, common, Tweed, Forth, Tay, Solway; not recorded from the south of England; it probably occurs in Ireland, but I can find no record. Although this species appears to be found more abundantly in hilly and mountainous districts, yet it is by no means a mountain species, as is proved by the above localities.

B. stomoides, Dej. Dark obscure metallic green, shining; antennæ reddish brown with the base testaceous, palpi entirely testaceous; in all the other species of the group the penultimate joint is more or less fuscous; thorax oblong, very convex, strongly and evenly rounded from behind anterior angles to some distance behind middle, thence contracted to base, posterior angles sharp, projecting, dorsal furrow distinct, abbreviated in front and behind, base coarsely punctured, basal foveæ

very deep, close to posterior angles, and bounded as in the three preceding species by a longitudinal fold; elytra long oval, with shoulders much rounded, sides also moderately rounded, convex, with deep punctured striae on disc, becoming evanescent towards sides and apex; legs entirely testaceous; the apex of the abdomen is also sometimes testaceous. L. 5-6 mm.

Rare; first taken by Mr. Bold in Cumberland, and afterwards in other localities in the extreme north of England; Whalley, Blackburn; banks of Calder; Teesdale (J. T. Harris in some numbers); Scotland, very rare on the banks of the Nith at Thornhill and Dumfries; Perthshire (Beaumont).

This very distinct insect might with good reason be placed in a separate group in company with the continental *B. rapipes*, Ill.; it is easily distinguished by its very convex form and long convex thorax; it is at first sight not like a *Bembidium*, but bears a strong resemblance to the insect from which its name is derived, *Stomis pumiliatus*.

Group VII. (**Lopha**, Meg. pars, **Peryphus**, Meg. pars.)

- I. Elytra with four well-marked light yellow, straw-coloured spots.
 - i. Frontal furrows parallel; thorax elongate; length 4-5 mm. B. QUADRIGUTTATUM, F.
 - ii. Frontal furrows convergent; thorax transverse; length 3 to 4 mm.
 1. First joint of antennae, and legs, black bronze B. QUADRIPUSTULATUM, Dej.
 2. First four joints of antennae, and legs, red B. QUADRIMACULATUM, L.
- II. Elytra with two large orange-coloured crescent-shaped spots before apex B. LUNATUM, Duft.
- III. Elytra orange testaceous except suture and a transverse band behind middle which are obscurely brassy green, the orange colour often diffused over the whole surface B. TESTACEUM, Duft.
- IV. Elytra with four distinct orange-coloured spots or patches, two at shoulders and two before apex, sometimes confluent.
 - i. Thorax distinctly transverse.
 1. Antennae entirely pale B. CONCINNUM, Steph.
 2. Antennae with first, or first and second joints pale.
 - A. Femora brownish towards base; base of thorax indistinctly punctured B. FLORATUM, Sturm.
 - B. Femora dark brown or blackish (except extreme apex); base of thorax distinctly punctured B. BRUXELLENSE, Wasm.
 3. Antennae with first three joints pale.
 - A. Outer striae of elytra feeble but distinctly traceable to apex B. SAXATILE, Gyll.
 - B. Outer striae of elytra effaced behind, often altogether evanescent.
 - a. Base of thorax almost impunctate; size smaller; upper surface flatter B. ANGLICANUM, Sharp.
 - b. Base of thorax distinctly punctured; size larger; upper surface more convex B. LITTORALE, Ol.
 - ii. Thorax at least as long as broad B. FLAVIATUM, Dej.

B. quadriguttatum, F. Head and thorax brilliant black, with a brassy or greenish reflection, elytra black with four light yellow patches, two at shoulders more or less triangular, and two round ones before apex; forehead with two strong parallel furrows; thorax about as long as broad, cordiform, very convex, with sides rounded in front and strongly but gradually contracted from about middle to base, posterior angles almost right angles but scarcely prominent, dorsal line distinct, basal foveæ deep; elytra oblong-ovate, with punctured striae plain towards base only, smooth from middle to apex; legs testaceous, femora (at least above) and knees dark. L. 4-5 mm.

Sandy banks of ponds, streams, and rivers; common and generally distributed in the southern and midland districts; local, but not rare in the north. Scotland, rare, Lowlands, Tweed, Forth: a small variety occurs at Luccombe Chine, Isle of Wight, which Mr. Gorham discovered in company with Dr. Sharp and myself, and which we thought at first must be *B. quadripustulatum*, the smallest specimens being only from 3 to 3½ mm. in length.

B. quadripustulatum, Dej. (Fig. Ent. Annual, 1871). Intermediate between the preceding and *B. quadrimaculatum*; from the latter it differs in its larger size and dark legs, from the former in its smaller size, shorter build, more transverse thorax, smaller and rounder elytral spots, and much more regular sculpture of the elytra, the punctured striae extending much further towards apex; from both species it may be distinguished by its entirely black antennæ. L. 3½-4 mm.

Rare; first taken by Mr. Gorham in a marshy place at Bearsted near Maidstone, and afterwards at Rasper near Horsham; one specimen was recorded from Repton, Burton-on-Trent, by the late Mr. W. Garneys.

B. quadrimaculatum, Gyll. Head and thorax dark metallic green or brassy black; elytra black, with four light yellow patches shaped as in *quadriguttatum*; thorax sculptured as in that species, distinctly broader than long, with the posterior angles acute, minutely prominent: antennæ dark with four basal joints red; elytra ovate, with fine but distinct punctured striae reaching nearly to apex, evanescent at sides; legs entirely testaceous, femora sometimes dusky. L. 3 mm.

Damp and sandy places near ponds or streams; common and generally distributed in the southern and midland districts, local in Yorkshire and Lancashire, but apparently entirely wanting in the extreme north; I can find no record from the Northumberland district, Scotland, or Ireland, but it probably occurs in the latter country; according to Schaum it is abundant over the whole of Europe, and also in North America, where it appears as *B. oppositum*, Say.

B. lunatum, Duft. Blackish or greenish bronze, shining, elytra with a very distinct more or less crescent-shaped orange spot on each on the posterior third, which meet or almost meet at suture; antennæ dark with three basal joints testaceous; thorax transverse, convex, rather short with sides very strongly rounded in front and contracted behind, posterior angles acute, projecting, dorsal furrow distinct, basal foveæ deep, base coarsely punctured: elytra about twice as broad as thorax at base, rather depressed, with very deep, plainly punctured striae, which

are evanescent at sides and apex; legs entirely pale testaceous. L. $5\frac{1}{2}$ -7 mm.

One of the largest and most distinct of our *Bembidia*.

Banks of streams and rivers, also damp places near the coast. Swansea; Norfolk; Bristol district; banks of Wye near Ross; Windley, near Blackburn; Preston (Lancashire); Bridlington, Yorkshire (rare); banks of Ribbles, Manchester; abundant near Liverpool, also on the shores of the Humber, and on the banks of the Irthing and other rivers in the north. Scotland rare, Tweed, Solway, Clyde. Two specimens have been recorded as taken at Shooter's Hill, Greenwich, but there is no other record from the London district, and none at all from the southern districts of England, where it must, at all events, be very local, if it occurs at all.

B. testaceum, Duft. (*obsolutum*, Dej.). Head and thorax dark metallic green, shining; elytra orange or reddish testaceous, except the suture and a very indistinct fascia or band behind middle which are obscure brassy green; the whole surface is often orange testaceous with a few cloudy markings; thorax subcordiform, rather narrow, almost as long as broad, posterior angles right angles, rather prominent, base more or less punctured between the basal foveæ; elytra rather long, twice as broad at base as base of thorax, with strongly punctured striae evanescent at sides and apex, seventh stria short and fiddle; legs reddish testaceous. L. 5 mm.

Rare; has occurred at Cobham near Horsell, Surrey (Power), and also in Sussex (Horner); it is however, as a rule, a northern species; it is found in the Northumberland district and elsewhere in the north of England; in Scotland it is very local, but is common in one or two places on the banks of the Nith in the Solway district.

B. concinnum, Steph. Distinguished from all the allied species by its entirely pale antennæ; broader and more depressed than either of the two following species; head and thorax greenish brassy; thorax shorter and wider than in *B. femoratum*, posterior angles slightly acute; elytra somewhat parallel-sided with the orange-testaceous markings well marked and confluent, never divided by a dark band behind middle, disc with deep punctured striae evanescent towards sides and apex; legs entirely pale testaceous. L. 5 mm.

Gravelly banks of rivers, &c.; local, but common where it occurs. Gravesend, Chatham, Barnes, Richmond, Berkley, Plumstead; Swansea; Barnstaple; banks of Derwent, Tyne and Tees; Preston, Lancashire; Yorkshire; Northumberland and Durham; Scotland, local, maritime. Tay, Solway, Clyde, Moray. Ireland, mouth of the Dodder and estuary of the Shannon near Limerick.

B. femoratum, Sturm. Head and thorax brassy black, hardly ever with a green tinge; antennæ as a rule with the first joint and base of the three following ones testaceous, but sometimes the second is entirely light; thorax subcordiform, more narrowed behind than in either the preceding or following species, posterior angles sharp, projecting, disc convex, dorsal foveæ slender but distinct, basal foveæ deep, base between foveæ slightly rugose or punctate; elytra with sides only slightly rounded.

* Since writing the above I have found reason to believe that *B. testaceum* is very probably some mistake with regard to this record.

with rather fine punctured striæ evanescent towards sides and apex, testaceous markings not confluent (or only at extreme sides); legs testaceous, femora pitchy at base. L. $4\frac{1}{2}$ –5 mm.

Damp sandy places; widely distributed throughout England: Scotland, local, Lowlands. Ireland, near Belfast; Killiney, Kingstown.

B. bruxellense, Wesm. (*rupestre*, L. (?), *femoratum*, Gyll.). Much darker than the other species of the group; somewhat resembles *femoratum*, but may at once be distinguished by its much darker legs, the femora being entirely pitchy; the head and thorax have a distinct greenish tinge; the antennæ are brownish black, the basal joint alone being entirely reddish testaceous; the thorax is broader than in *femoratum*, with the posterior angles more acute, the dorsal furrow stronger, and the basal foveæ larger; the elytra are broader with stronger striæ; the orange spots are smaller, and are divided by a much broader dark space, so that the prevailing colour appears to be dark; femora as above, tibiae reddish testaceous, tarsi darker red. L. 5 mm.

Marshy places, on the banks of rivers, near ponds in woods, &c. Local, but often abundant where it occurs; not common in the London district; Bearsted, near Maidstone; Southampton; Forest of Dean; Bewdley; Sutton Park, Birmingham; Repton (very common on the sides of a pond in Robins Wood); Cannock Chase; Scarborough; Northumberland and Durham, widely distributed, but rather rare; Scotland, common, Lowlands; Ireland, local near Dublin and elsewhere.

B. saxatile, Gyll. Dark brassy green, elytra with two testaceous spots on each, the one at shoulder extending from the outer margin almost, if not quite, to the suture, the posterior one round, lighter, and more conspicuous; antennæ dark with three basal joints, and the base of the two following, reddish testaceous; thorax transverse, rather short, with sides strongly rounded in front and contracted behind, posterior angles sharp, somewhat projecting, basal furrow strong, basal foveæ deep, punctured; elytra with sides somewhat parallel with strong punctured striæ, which become as usual feebler towards sides and apex, but are all, even the exterior ones, distinctly carried to apex, a point which at once distinguishes the species from its allies; legs testaceous, femora occasionally dusky at base. L. 4 – $4\frac{1}{2}$ mm.

Marshy places; river banks and on the coast; widely distributed and not uncommon throughout England. Scotland, very local, Tweed, Tay, Solway; Ireland, near Dublin and other localities: the northern specimens are dark, and the southern ones light: there is a permanent variety found in the Isle of Wight which I would separate under the name *var. rectensis*; the elytra are more parallel-sided than in the type, the colour is paler, and the spots larger, the humeral ones being suffused over almost the whole anterior half of the elytra, and the posterior ones round, very large, and conspicuous.

B. anglicanum, Sharp. Closely allied to *B. femoratum*, but rather larger on an average, with the head, thorax, and dark parts of the elytra of a distinct metallic green colour, instead of dark-brassy; it differs also in having at least three joints of the base of the antennæ entirely pale, and the bases of the following joints more or less so, instead of only one or two entirely, and the base of the third being pale; also in its longer

antennae, lighter palpi, broader and flatter elytra, slightly broader and flatter thorax, and generally entirely pale legs, the femora being sometimes a little pitted in the middle, instead of always entirely pitted.

Local; banks of rivers and streams near Dumfries; also in the Tweed, Forth, and Moray districts; Dr. Sharp considers that in all probability this is the insect described by Stephens as *Peryphus maritimus*, taken by Mr. Rudd on the banks of the Tees; near Lanercost, Cumberland (Bolt).

B. littorale, Ol. (*Andreae*, Er., *ustulatum*, L. (H. R. W.)). Head and thorax bronze green, elytra obscure bronze with two orange testaceous patches on each, separated by a broad dark space; antennae brownish with the three first joints and base of the two following reddish testaceous; thorax distinctly transverse, with the sides strongly rounded in front and contracted behind, posterior angles sharp right angles, base plainly punctured in the middle, with a large deep punctured fovea on each side, dorsal furrow distinct; elytra long oval, rather convex, rounded at sides, with deeply impressed punctured striae, becoming evanescent towards sides and apex; legs entirely pale testaceous. L. $5\frac{1}{4}$ mm.

Very common and widely distributed throughout the kingdom.

B. fluviatile, Dej. More elongate and convex than the preceding, and with the orange markings on elytra brighter, especially when the insect is alive; head narrower, antennae longer; thorax much narrower and longer (at least as long as broad), with the sides less rounded in front, dorsal furrow finer, basal foveae smaller; elytra narrower and longer, more convex, the inner striae not quite so strong, but the outer ones almost as strong as the inner, seventh stria usually distinct; legs testaceous; easily distinguished from the preceding, which is the only species it is likely to be mistaken for, by its long narrow thorax. L. $5\frac{1}{2}$ 6 mm.

Very local; apparently only found in the midland and mid-western districts of England; banks of Wye near Ross; Bewdley; Draycott, near Derby; banks of Trent and Dove near Repton and Burton-on-Trent; banks of Trent near Newark; it burrows in sandy places, and conceals itself in crevices in the clayey banks of streams; I have obtained it and many other Bembidia by dashing the water up against the banks, when the beetles rush out apparently under the idea that a flood is rising; it appears to be a local and somewhat rare species on the Continent.

Group VIII. (**Notaphus**, Steph. pars.)

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|--|-------------------------------|
| I. Elytra testaceous with dark markings; antennae and legs pale | B. PALLIDIPENNE , Ill. |
| II. Upper side entirely bronze, unicolorous; antennae and legs black | B. BIFIDICATUM , L. |

B. pallidipenne, Ill. (*Andreae*, Dej., Steph., Ill.). Head and thorax bronze green, with a coppery reflection, elytra light testaceous with an irregular transverse dentate band a little behind middle, and also a triangular space about scutellum brownish bronze or greenish; antennae short and stout entirely testaceous, eyes black and prominent; head

punctured; thorax scarcely broader than the head with eyes, rather short, dilated and rounded below anterior angles (which are punctured), contracted behind, posterior angles right angles, not projecting, dorsal furrow distinct, base depressed and punctured, basal foveæ shallow; elytra broad, short, round oval, convex, disc with punctured striæ reaching beyond middle, evanescent towards sides and apex; legs testaceous. L. $4\frac{1}{2}$ mm.

Sedgy margins of streams, and damp places, near the sea in Norfolk, Suffolk, Essex, Dorset, Devon, &c.; Bournemouth; shores of Bristol Channel; Swansea; Lytham and Liverpool; Norfolk; Northumberland; Holy Island; Scotland, local, Forth, Moray, Clyde, Argyle. Ireland, near Belfast; Baldoyle; Killarney; Lough Neagh.

B. bipunctatum, L. Bronze or brassy, sometimes bluish black or blackish; antennæ and palpi black; head and anterior and posterior margins of thorax strongly punctured; thorax transverse, subcordiform, posterior angles sharp, rather prominent, dorsal furrow and basal foveæ near posterior angles distinct; elytra considerably broader than thorax, with fine punctured striæ, evanescent towards sides and apex, third interstice with two large deep impressions, from which the species derives its name; legs black, somewhat metallic. L. 4 mm.

Gravelly banks of rivers, &c.; local, but widely distributed. Richmond, Wandsworth, Putney, Notting Hill; Bewdley; Cannock Chase; Swansea; Cheshire; Liverpool; Northumberland and Durham; Scotland, common, as far north as the Moray district; Ireland, Portmarnock and near Belfast.

Group IX. (*Notaphus*, Steph. pars.)

- I. Head and thorax punctured; upper side unicolorous bronze **B. PUNCTULATUM**, *Drap.*
- II. Head and thorax smooth.
 - i. Upper side unicolorous black; striæ of elytra impunctate **B. PRASINUM**, *Deft.*
 - ii. Elytra with more or less distinct markings; striæ of elytra punctured at all events to middle.
 1. Antennæ entirely testaceous; elytra testaceous with a dark, more or less indistinct band behind middle **B. EPHIPPIMUM**, *Marsh.*
 2. Antennæ dark, except base; elytra bronze with wavy yellow markings.
 - A. Thorax with well-marked lateral border; apex of abdomen testaceous **B. FLAMMULATUM**, *Clairv.*
 - B. Thorax with narrow and indistinct lateral border; abdomen unicolorous.
 - a. Legs and base of antennæ light (femora darker).
 - a*. Striæ of elytra finer; size larger . . . **B. VARIUM**, *Ol.*
 - b*. Striæ of elytra deeper; size smaller . . **B. ADUSTUM**, *Schaum.*
 - b. Legs and antennæ (except first joint) black **B. OBLIQUUM**, *Sturm.*

B. punctulatum, *Drap.* (*velox*, Daws. G. Brit.). Bronze or brownish brassy, occasionally blue black: in general appearance it much resembles *B. bipunctatum*, but is larger, and has all the striæ of the elytra entire and plainly continued to apex; head coarsely punctured; antennæ dark

with the first joint red; thorax hardly broader than long, cordiform, coarsely punctured, especially on the sides, with strong dorsal furrow and feeble basal foveæ, posterior angles not projecting; elytra double as broad as the base of thorax, somewhat rounded at sides, striæ entire, plainly punctured. L. 5 mm.

Gravelly banks of rivers; rare in the London district, Kew and Richmond (banks of Thames), Burford Bridge, Surrey (banks of Mole); much commoner in the Midlands and the north than further south; Yorkshire, Lancashire, Derbyshire, Cumberland, Durham, &c.; common on the banks of the Dove near Burton-on-Trent; Scotland common as far north as the Moray district; Ireland, banks of Dodder and near Belfast.

B. prasinum, Duft. (*olivaceum*, Gyll.). Obscure greenish bronze, almost black; antennæ blackish, first joint reddish, either entirely, or at least on the underside; thorax distinctly broader than long, with sides not strongly rounded in front and slightly narrowed behind, so that the base is plainly wider than in most of the allied species, posterior angles prominent, dorsal furrow distinct, basal foveæ deep and broad, rugose, bounded by a strong longitudinal fold; elytra very flat, deeply striated, the striæ impunctate, all entire to apex; legs black, base of femora brownish. L. 5 mm.

Rare, or rather very local; Balverhythe, near Hastings; banks of Severn, Bewdley; banks of Dee, Hlangollen; banks of Ribble, Lancashire; Helmsley, Yorks.; Carlisle; Northumberland and Durham. Scotland, local, Solway, Tweed, Forth, Tay, Moray; not recorded from Ireland.

B. ephippium, Marsh. (*pallidipennis*, Dej.). Head and thorax greenish bronze, shining, elytra testaceous with a common more or less indistinct, sometimes almost obsolete dusky patch behind, and another about scutellum; antennæ testaceous; thorax a little broader than long, subcordiform, with the posterior angles sharp, elevated and projecting, dorsal furrow very distinct, basal foveæ large, base with a large pore on each side of dorsal furrow; elytra oblong, rather parallel-sided, striæ all entire and distinct to apex, where some of them unite in pairs; legs testaceous, femora often with a slight metallic reflection, which is also often apparent on the elytra. L. 3 mm.

Salt marshes; on the muddy banks of ponds, &c.; local, but common where it is found; Whitstable; Sheerness; Lymington Salterns and Christchurch, Hants; Hastings; Isle of Sheppy; Norfolk coast; Birchington, near Margate; apparently confined to the south and south-eastern districts of England.

B. flammulatum, Clairv. (*deut-flum*, Thunb.). Head and thorax bronze or greenish bronze, rather dull; elytra darker or lighter brown, somewhat brassy, with a distinct wavy band stretching right across between middle and apex, and other more or less obscure testaceous markings; antennæ dark with the first joint (at all events underneath) and the base of the three following yellowish or yellowish-brown; thorax subcordiform, disc convex, posterior angles sharp, dorsal furrow strong, especially in middle, basal foveæ large, space between them depressed

and striated longitudinally; elytra long oval, all the striae distinct and entire, plainly punctured until beyond middle, where the punctures cease and the striae become slightly feebler; legs brownish testaceous, upper side of femora metallic; apex of abdomen testaceous. L. $5-5\frac{3}{4}$ mm.

Marshy places, at roots of grass, beneath dead leaves, &c.; also on the banks of rivers and streams; rather local, but widely distributed and common where it occurs, as far north as Yorkshire; rare towards the north, and not recorded from Northumberland and Durham; Scotland, very rare, Lowlands, Tweed, Forth, Solway; has not yet, apparently, been found in Ireland, but probably occurs at all events in the south.

B. varium, Ol. (*ustulatum*, Sturm.). Smaller than the preceding, with the elytra shorter, squarer at shoulders, and testaceous markings much less distinct, sometimes almost obliterated, although rarely examples occur in which the light colour predominates; the thorax is shorter, with smoother disc, less distinct dorsal furrow, slightly less prominent posterior angles, and the base and basal foveae smoother; elytra much more finely striated, especially towards apex; apex of abdomen concolorous (very seldom lighter than the rest); legs pitchy testaceous. L. 5 mm.

Marshy places, banks of ponds, &c.; local but often abundant on the coast where it occurs, but always rarer inland; it occurs as far north as Yorkshire, where Mr. Hey has taken it on Spurn Head; further north it appears to be entirely wanting, and it has not occurred in Scotland; Ireland, Armagh, banks of Liffey, and other localities.

B. adustum, Schaum (*rupestre*, Daws. G. Brit., *varium* var. *A.*, Duv.). About the size of *B. fumigatum*, which it very much resembles in general appearance, but may be at once distinguished by having the striae of the elytra entire and complete to apex, whereas in *fumigatum* the apex and sides are smooth; the thorax is less contracted at base than in that species, and the legs are darker: compared with *varium*, it may at once be distinguished by its much smaller size; the thorax also is less rounded at the sides and less contracted behind (although in these points the species seems liable to a little variation); the elytra are more oval and less parallel-sided, the testaceous bands and markings as a rule much more distinct, and the striae are deeper and more strongly punctured. L. $3\frac{1}{2}-4$ mm.

Margins of rivers and streams, among shingle, or concealed in erevices in the banks; this and the succeeding species are instances of the way in which those insects which have been considered extremely rare occasionally turn up in numbers: Dawson (G. Brit. p. 197) states that the only examples that he had seen were in Stephens' cabinet, and were stated to have been taken in Swansea: no other example was taken until about 1878, when Mr. J. T. Harris found a specimen on the banks of the Severn at Upton-on-Severn; in 1879, however, Mr. W. G. Blatch found it in profusion on the banks of the Severn near Tewkesbury, a few miles below Upton, and I have since taken it there myself; it has not, however, been recorded from any other locality. Instances like the capture of this insect, of *Spercheus emarginatus* by Mr. Billups, and lately of *Hydnobius Perrisii* by Mr. Gardner of Hartlepool, tend to prove that very few beetles are really rare if we can find out their localities and habitats; at the same time a study of the localities above given for the *Bembidia* will show that there

are very few beetles that can be called common in the sense of being generally distributed throughout the kingdom.

B. obliquum, Sturm. This species in many ways closely resembles *B. varium*, but it is considerably smaller, and may be distinguished, apart from this, by the much more rounded shoulders and sides of the elytra, and by the darker legs and base of antennæ; thorax short, with sides not much narrowed behind, posterior angles sharp, projecting, dorsal furrow rather fine, basal foveæ deep; elytra rather more strongly sculptured than in *varium*, especially at apex, punctures of striae ceasing towards apex, testaceous bands and markings very irregular and interrupted; apex of abdomen concolorous; legs black, or very dark pitchy. L. 4 mm.

Sandy banks of ponds, rivers, &c.: Dawson (G. Brit, 196) says that he knew of only one example taken by Mr. Bold at Gosforth (near Newcastle-on-Tyne); since then it has been found at Hornsea, Yorkshire; Brighton; Maidstone; banks of Trent near Burton (one specimen), Thornton Reservoir, Leicestershire, in numbers (Dr. Power), Clifton, near Manchester (T. Morley), St. Leonards, Sussex, rather common (H. S. Gorham), and also at Dulwich (one specimen on the borders of a pond, T. Wood).

Group X. (**Bracteon**, Bedel.)

B. paludosum, Panz. (*littorale*, Ol.). Head and thorax coppery bronze, sometimes purplish, dull, elytra of the same colour but more shining, especially on disc; antennæ dark, underside of the first joint sometimes yellowish; thorax broader than head, about as broad as long, with sides slightly rounded in front, sinuate behind middle and slightly contracted to base, anterior angles somewhat projecting, posterior angles small, acute, slightly prominent, dorsal furrow distinct in middle, basal foveæ small but distinct; elytra oval, somewhat convex, with striae all entire, plainly punctured until behind middle, punctures effaced towards apex; third interstice very broad with two large dull oblong silvery pits, one about middle, the other behind; legs obscure greenish bronze, extreme base of femora testaceous. L. 5-6 mm.

This insect is more brightly coloured when alive than dead; it runs with surprising agility, and is very difficult to secure, as it takes to wing if disturbed, like a Cicindela, and flies out over the water, especially in hot sunshine: it is found on the sandy and gravelly banks of rivers and streams, and is very local, but sometimes very abundant where it occurs; it is mostly a northern species, and does not seem to be found in the south; Matlock, Lovers' Walks; banks of Derwent, Cumberland; banks of Till, Northumberland; banks of Rye, near Helmsley, Yorkshire; Durlan; Ashley, common; Scotland, very local, Tay, Clyde, Moray; Ireland, near Belfast; Lough Neagh; Kerry.

TACHYPUS, Lacordaire.

This genus comprises about a dozen species, most of which are found in Europe and Northern Asia; one only is found as far south as India, and one occurs in Japan; their appearance is very distinct, owing to their very large eyes and the pubescence and peculiar sculpture of the elytra; the importance of the pubescent soles of the dilated joints of the anterior tarsi of the males has already been pointed out.

1. Thorax at least as long as broad; femora metallic on upper surface; first or first and second joints of antennæ bronze green; size larger *T. PALLIPES*, *Duft.*
2. Thorax broader than long; femora entirely testaceous; antennæ with four or five basal joints entirely testaceous; size smaller *T. FLAVIPES*, *L.*

T. pallipes, *Duft.* Upper side coppery bronze, elytra spotted with metallic green or purple, especially at sides; head and thorax rugose, the latter finely punctured on disc; antennæ with the basal joint and part of the second, at all events above, bronze green, third, fourth, and sometimes fifth testaceous, the rest fuscous; thorax as long as broad, with sides rounded in front and rather gradually contracted behind, posterior angles right angles, minutely projecting, dorsal furrow slight, basal foveæ small; elytra exceedingly finely and minutely punctured, clothed sparingly and irregularly with ashy pubescence, especially at sides, striæ faintly indicated on disc, third interstice with two large deep pores; legs testaceous. L. 5-6 mm.

Banks of rivers and streams; very local, and by no means common, although it has been taken in some numbers in a few localities; Preston, Lancashire; Swansea; Norfolk; Colechester; banks of the Till and Irthing in the Northumberland district. Scotland, rare, Solway, Moray, Clyde.

T. flavipes, *L.* Upper side coppery or greenish bronze; much smaller than the preceding; base of the antennæ entirely testaceous; thorax short, with sides more strongly contracted behind middle than in *T. pallipes*; the sculpture also of the whole upper surface is coarser; the elytra are duller and less brightly coloured, with more evident and closer pubescence. L. 4-4½ mm.

Common and generally distributed from the Midlands southward; less common towards the north; Scotland, not common, Lowlands; Ireland, Killiney Beach, Kingstown, and other localities; it is found on the banks of rivers and streams, and also in damp places beneath moss, stones, dead leaves, &c.

TRECHINA.

This tribe contains several genera which differ very widely from one another, and seem at first sight to have very little in common except that they have the first two joints of the anterior tarsi dilated in the male; the genera *Æpus* and *Perileptus*, for instance, are very different from *Trechus*, and all three appear to be widely separated from *Patrobis* and *Pogonus*; the two first-mentioned genera, however, show a decided affinity with the Bembidiina, so much so that it is very doubtful whether *Perileptus* at all events ought not to be classed with that tribe; *Æpus* shows a connection with *Trechus*; and *Pogonus* (with which *Patrobis* must provisionally be classed) exhibits a decided leaning towards *Bembidium*, certain species of which, e.g. *B. ægyptiacum* and *B. pygmeum*, are very like species of this genus; the real affinity, however, between the two genera lies in the genus *Oethozetus* (from the Pampas), which is a close connecting link between *Pogonus* and the *Brachion* section of *Bembidium*.

Patrobis and *Pogonus* again resemble the *Bembidia* in having the apical edge of the ligula unisetose, while *Aëpus* and *Perileptus* differ from that genus (with which in many ways they are so closely connected) by having this part plurisetose, in which point they resemble *Trechus*. Dr. Horn divides the tribe, which he names Pogonina, as follows:—

Terminal joint of palpi more or less cylindrical and obtuse at tip, that of the labial palpi as long as the preceding	<i>Pogoni.</i>
Terminal joint of palpi slender, acute at tip, that of the labial palpi shorter than the preceding	<i>Trechi.</i>

This division, however, will not hold completely, as the comparative length of the terminal and penultimate joints of palpi is very variable, especially in *Pogonus*; they may, perhaps, be classed as follows:—

- I. Ligula plurisetose in front.
 1. Apical joint of all the palpi much shorter than penultimate, which is dilated Group *ÆPYÆS*.
 2. Apical joint of maxillary palpi about as long as penultimate, which is not dilated Group *TRECHI*.
- II. Ligula unisetose in front. Group *POGONI*.

As, however, these characters are somewhat obscure, the more obvious characters that separate the genera belonging to the groups (which are respectively *Aëpus* and *Perileptus*, *Trechus*, and *Pogonus* and *Patrobis*) are here given in a combined table.

- I. Lateral margin of elytra not prolonged at base from shoulder to scutellum; upper side of tarsi not longitudinally furrowed.
 - i. Elytra separately rounded, about as long as the head and thorax combined; apex of abdomen exposed *ÆPUS*, *Sam.*
 - ii. Elytra jointly rounded, longer than head and thorax combined; apex of abdomen completely covered.
 1. Sutural stria recurved at apex *TRECHUS*, *Clairv.*
 2. Sutural stria not recurved at apex.
 - A. Elytra pubescent; maximum size 3 mm. *PERILEPTUS*, *Schaum.*
 - B. Elytra smooth; minimum size about 7 mm. *PATROBUS*, *Dej.*
- II. Lateral margin of elytra prolonged at base from shoulder to scutellum; upper side of tarsi longitudinally furrowed *POGONUS*, *Dej.*

PERILEPTUS, Schaum. (*Blennus*, Daws.)

This genus is intermediate between the *Trechina* and the *Bembidiina*; in the form of the palpi it much resembles *Bembidium*, but at the same time the terminal joint, although very short in comparison with that of *Trechus*, is considerably longer than it is in *Bembidium*, and in the formation of the ligula (which is plurisetose in front) and paraglossæ it more nearly approaches *Trechus*; on the other hand it differs from the latter genus and resembles the former in the fact that the sutural stria of the elytra is not recurved at apex, and it closely resembles *Lymnæum*, which is now very often classed with *Bembidium*, in the fact that both sexes have the penultimate joint of the anterior tarsi

armed with a curved spine beneath : three species are comprised in the genus besides our own, which is the only one found in Europe ; these are found respectively in the Island of Bourbon, in Teneriffe, and in Nubia.

P. areolatus, Creutz. Oblong, pubescent ; head and thorax pitch-black, elytra pitchy or brownish, with a common lighter patch across the middle ; antennæ brownish with base lighter ; thorax hardly broader than the head with eyes, almost as long as broad, cordiform, much contracted behind, posterior angles sharp, projecting, dorsal furrow deep, base with a shallow fovea on each side near posterior angles ; elytra much depressed, almost parallel-sided, more finely pubescent than thorax, with rather well marked, feebly punctured striæ, becoming evanescent towards sides and feebler towards apex, third interstice with the usual two pores ; legs yellowish red. L. $2\frac{1}{2}$ mm.

Rare, although found in some numbers where it occurs. Dudden Sands, near Broughton-in-Furness, Lancashire ; Conway (confluence of the Conway and Llugwy), North Wales (Brewer, &c.) ; Scotland very local, riparial, Solway district (taken in some numbers by Dr. Sharp) ; it ranges over the middle and south of Europe, and has occurred in Norway, and it is found also in Algeria and the Caucasus district.

ÆPUS, Samouelle.

This genus comes nearer to *Trechus* than does the genus *Perileptus*, and forms a further link in the chain of connection between the Bembidina and Trechina, the palpi being intermediate in form between the two above-mentioned genera ; the ligula is plurisetose as in *Trechus* ; the anterior tarsi have the penultimate joint armed with a spine as in *Perileptus* and *Lymnaeum* : the species are remarkable for their structure, and also for their peculiar habits ; they are found under stones, usually below high-water mark in spots that are entirely submerged at high water ; occasionally a curious Hemipteron *Æpophilus* is found in company with them ; four species are known, two from Europe, one from Madeira, and one from Chili : the larva of *Æpus* is described by Coquerel (Annal. de la Soc. Ent. Fr. 1850, p. 529, Pl. xvi., Fig. 3) ; it is found in the same situations as the perfect insect, and is distinguished by its very large head and mandibles ; like the larvæ of Bembidium it possesses only one tarsal claw ; Westwood figures this larva and the pupa in error as those of *Micralymma Johnstoni*, a species which is found in the same situations as *Æpus*. (Classif. i. p. 166, Fig. 15, 16 ; see also page 169.) Cf. Laboulbène, Ann. Fr. 1862, p. 564-65.

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| I. Dorsal furrow of thorax deep ; elytra longer, parallel-sided | A. MARINUS, Ström. |
| II. Dorsal furrow of thorax indistinct ; elytra short, somewhat widened behind | A. ROBINII, Laboulb. |

A. marinus, Ström. (*fulrescens*, Sam.). Entirely testaceous, apterous, very depressed, slightly pubescent, with long outstanding hairs especially at apex and sides of elytra ; head very large, as long as thorax,

eyes very small sunk into the head, black, mandibles large and strong ; thorax cordiform with anterior margin straight, sides obliquely contracted towards base, posterior angles sharp, rather minute ; elytra parallel-sided, with irregular traces of striae and punctuation, usually with two or three or more distinct large pores or impressions on each ; legs testaceous. L. 2 mm.

Local, but occasionally plentiful where it occurs ; Luccombe Clime, and Ventnor, Isle of Wight ; Weymouth ; Watermouth (North Devon) ; Doniford (Somerset) ; mouths of the Tamar and Yeame and other localities in the south-west ; Northumberland and Durham district, Berwick-upon-Tweed, &c. ; Scotland, local, Tweed, Forth, and Clyde districts, in the Isles of Bute and Arran, &c. ; Ireland, near Dublin, and Strangford Lough.

A. Robinii, Laboulb. Very like the preceding, but differs in the following particulars : the thorax has the posterior angles considerably blunter, and the sides less sinuate before base, the dorsal furrow being much less apparent ; the elytra are less parallel-sided and are dilated behind middle and shorter, and the entire upper surface is smoother and shows less trace of sculpture. L. 2 mm.

Rarer than the preceding ; Weymouth ; Ventnor ; Plymouth ; Northumberland and Durham district. Scotland, Tweed and Forth districts.

TRECHUS, Clairville.

The genus *Trechus* proper comprises about one hundred and thirty species, which vary considerably in size and general appearance ; they are chiefly found in Europe, North America, and the Atlantic islands (Madeira, &c.) ; a very small proportion come from the southern hemisphere ; some authors include under *Trechus* the peculiar genera *Amophthalmus* and *Aphatopus*, which are distinguished by having no eyes ; these are found in the caves of the Pyrenees and the Alps and in North America (especially Kentucky), and number about fifty species ; two species of *Aphatopus*, as Bedel points out (l. c. p. 49), have the anterior tarsi simple in both sexes as is the case in some species of *Tachys*, and one species of *Trechus* (*T. ochroleucus*) from the Austrian Alps has the posterior femora dilated and denticulate in the male.

Our species may be subdivided as follows :—

I. Elytra finely pubescent.

- i. Elytra reddish, with a broad black band behind middle ; striae plainly punctured. **T. DISCUS**, F.
- ii. Elytra reddish yellow, with a very obscure black spot (often absent) towards apex of each ; striae almost impunctate. **T. MICROS**, Hochst.

II. Elytra not pubescent.

- i. Posterior angles of thorax sometimes sharp, sometimes very blunt, but always traceable.
 1. Elytra with parallel sides ; antennae very long **T. LONGICORNIS**, Strem.
 2. Elytra with sides rounded ; antennae moderate.

- A. Elytra with striae broad and deep to margins *T. LAPIDOSUS*, *Daws*.
 B. Elytra with striae plainly feebler at sides.
 a. Size larger; thorax cordiform; posterior angles sharp *T. RUBENS*, *F*.
 b. Size smaller; thorax not cordiform; posterior angles blunt *T. MINUTUS*, *F*, and *v. OBTUSUS*, *Er*.
 C. Elytra with three deep striae near suture, the second and third, as a rule, not or scarcely reaching beyond middle *T. RIVULARIS*, *Gyll*.
 ii. Posterior angles of thorax completely rounded *T. SECALIS*, *Payk*.

***T. discus*, F.** Testaceous red, rather pubescent, elytra with a common blackish or blue-black patch behind middle; eyes black, prominent; antennae long, testaceous; thorax cordate, much narrowed behind, posterior angles acute, projecting, disc convex, dorsal furrow deep, base with a deep fovea on each side; elytra long, with sides slightly rounded, finely striated, interstices finely but distinctly punctured, third stria with two large pores which stretch over the fourth interstice; legs pale testaceous. L. $4\frac{1}{2}$ –5 mm.

Very local, but not uncommon in the midland counties: it occurs on the banks of streams and rivers; banks of Trent, Repton and Newark; banks of Dove, Burton-on-Trent; banks of Derwent below Derby; banks of Severn, Bewdley and Tewkesbury; Draycott; Salford Priors; Boxted, Essex; banks of Ribble, Sawley, Lancashire; Hornsea, Pontefract, Scarborough, Yorkshire; Vale of Towey, Wales; it has also occurred in Norfolk, Suffolk, Cambridgeshire, and Bedfordshire; also formerly at Notting Hill; it is not recorded from the extreme north or south of England, or from Scotland or Ireland.

***T. micros*, Herbst.** More elongate, and narrower than the preceding, with the elytra more parallel-sided: it is also of a duller testaceous colour, and has the dark markings on the elytra obscure and often absent or nearly so; eyes not prominent; antennae testaceous; thorax much as in *T. discus*, except that it is rather narrower in front, with the sides somewhat less strongly narrowed behind, and the posterior angles quite as sharp, but slightly less prominent; elytra finely striated, interstices very thickly and finely punctured, with two pores on each as in the preceding species. L. 4 mm.

Very local, but much more widely distributed than the preceding: it is found in the majority of the localities just mentioned for *discus*, and further occurs at Darenth Wood, Horsham, Tonbridge, Matlock, York, Carlisle, and other places; Northumberland and Durham in rejectamenta on the banks of streams; Scotland, rare, Tweed, Forth, Solway, Clyde, Argyle; it does not, however, appear to be a southern insect: these two species conceal themselves in the crevices of sandy or clayey banks; I have taken both by dashing water against the sides, and thus causing them to run out from their hiding-places.

***T. longicornis*, Sturm.** (*Thalassophilus*, Woll.). Somewhat resembles a small specimen of the preceding, but may at once be distinguished by its very long antennae, which are at least two-thirds as long

as the whole body; colour testaceous, or reddish brown, often darker at sides and suture; thorax short about the length of the head, with sides rounded in front and rather gradually contracted to base, posterior angles almost right angles, dorsal furrow rather fine, base with two foveæ; elytra parallel-sided, depressed, finely striated, the three striae next suture more distinct, third stria with two pores; legs testaceous. L. $3\frac{1}{2}$ mm.

Very rare; first taken at Dudden Sands, near Broughton, Lancashire; banks of Ribble; banks of Irthing, Northumberland (Bold); near Kelso (R. Hislop); banks of the Nith at Thornhill and Dumfries (Sharp and Lennon).

T. lapidosus, Daws. (*fulvus*, Dej. ?). Testaceous or reddish testaceous; eyes not prominent; antennæ testaceous; thorax nearly as broad in front as behind, with sides strongly rounded almost to base, and margins elevated, posterior angles sharp, somewhat projecting, dorsal furrow fine, base with two rather large foveæ; elytra ovate, much depressed, with strong, broad, finely punctured striae, which are not feebler at sides or apex, third stria with two pores; legs pale testaceous. L. $5\frac{1}{2}$ mm.

Sandy places on the coast, under stones, just above high-water mark; also at the mouths of tidal rivers; very local, but sometimes found in numbers where it occurs. Ventnor, Isle of Wight (not common under large stones to the west of the town); Southend; Shoreham; Deal; Dover; Sheerness; Hythe; North Wales; Northumberland and Durham district, banks of streams and sea coast, rare; Scotland, very local, Lowlands, Tweed and Clyde districts, and also at Tain, Ross-shire. Ireland, Holywood, one specimen (Haliday); Killiney Beach, one specimen (McNab's Dublin list).

T. rubens, F. (*paludosus*, Dej., &c.). Pitchy red, more or less dark, shining; antennæ and palpi reddish testaceous; thorax rather broad cordiform, distinctly transverse, with sides strongly rounded in front, narrowed behind, posterior angles acute and somewhat prominent, disc convex, dorsal furrow strong, basal foveæ deep; elytra long oval, with sides wider and more rounded behind middle, rather lighter than head and thorax, with metallic reflection, each with seven punctured striae, of which the inner five are plain, the sixth and seventh feebler but plainly traceable; underside pitchy black, apex of abdomen pale; legs testaceous. L. $5\frac{1}{2}$ mm.

Local and rare; on the banks of ponds and streams, under dead leaves and rejectamenta, &c.; Whittlesea Mere (formerly common); Llanberis; Lydford (Devon); Cannock Chase; Egginton, near Burton-on-Trent; Repton (side of pond in Robins Wood); Sindley, near Ripon; Hull; Northumberland and Durham district (Hetton Hall, Long Benton, Winton Mill and by the Irthing); Scotland, rather widely distributed but never common, Tweed, Forth, Tay, Solway, Clyde, also taken in the Shetland and Orkney Islands; Ireland, Clontarf (Dublin) and Killiney (Kingstown), very rare; not recorded from the London district or the south of England.

T. minutus, F. (*quadristriatus*, Schrank.). Pitchy red or ferruginous, the head darker and almost black, elytra lighter at the shoulders and often at sides; antennæ testaceous; thorax transverse, feebly rounded at the sides and slightly contracted towards base, posterior angles blunt but traceable, disc very smooth, with a deep dorsal furrow, base with a

large fovea on each side near angles; elytra oblong ovate, much broader than thorax, slightly dilated behind middle, with four striae next suture distinct, the rest more or less obsolete, third stria with two inconspicuous pores; legs testaceous. L. $3\frac{1}{2}$ mm.

Sandy places on the coast and inland; common and widely distributed throughout the kingdom.

T. obtusus, Er. This variety, which has by many authors been considered a separate species, differs from the type in the following particulars: the thorax is more rounded at the sides, and has the posterior angles blunter, so that they almost appear to be rounded; the elytra are shorter, more rounded at the sides, and rather more dilated behind middle, with two striae next the suture plain instead of four; the pores on the third stria are also more conspicuous; the wings, moreover, are more or less rudimentary instead of being fully developed as in the type; this last point, however, as we have seen in the case of *Calathus fuscus* (supra, p. 81), is of not much weight specifically, and taking into consideration intermediate forms, the other distinctions are so comparatively slight that they are hardly enough to found a species on.

This variety is widely distributed over England, and is found in much the same localities as the type, but is always much rarer; it is common in Scotland both in the Lowlands and Highlands, being apparently the commoner in the latter districts.

T. rivularis, Gyll. (*incilis*, Daws.). Pitchy-black or brown, sometimes ferruginous, with a metallic reflection on the elytra; antennae reddish testaceous, the second, third, and fourth joints brownish, lighter at apex; thorax transverse, with the sides rounded, very slightly contracted behind, side margins plain especially behind, posterior angles small, acute, somewhat projecting, disc rather convex, dorsal furrow fine, basal foveae large; elytra long oval, somewhat convex, with three deep broad striae near suture, of which the first reaches nearly to apex and is recurved, and the second and third are abbreviated; a fourth stria is more or less plainly indicated; underside blackish or reddish with the apex of the abdomen lighter; legs reddish testaceous. L. 5 mm.

Very rare; has not occurred for many years, and is perhaps extinct; Whittlesea Mere, July 1847 (Dawson); Holme Fen, several specimens (Power): the latter locality has been brought under cultivation, or at all events the portion in which the specimens were taken.

T. secalis, Payk. (*Epaphius*, Leach). Pitch-brown or ferruginous, shining; antennae testaceous; thorax short, very convex, with sides strongly rounded, contracted behind, posterior angles quite rounded; elytra oval, convex, with very coarsely punctured striae, becoming obsolete towards sides, third stria with the two usual pores; legs testaceous. L. $3\frac{1}{2}$ mm.

This very distinct species may be at once known by its short oval

elytra and the very strong and coarse punctuation of the striae on disc; it is found on damp sandy banks of ponds and rivers, and is often common in flood refuse; it is, however, rather local, although widely distributed throughout the country as far north as Northumberland; here, however, it appears to cease, as it is only found rarely in Scotland in the Tweed district, and there are no records from any other locality.

PATROBUS, Dejean.

The species belonging to this genus are entirely confined to the northern districts of Europe, Asia, and North America; in the Munich Catalogue twenty-seven species are enumerated, but the species that inhabit the more southern districts of Europe have been divided off under the genera *Penthetus* and *Deltomerus*, and several of the others have been sunk as varieties, so that about ten species now remain; these are of moderate size, usually dark coloured, or with the elytra dull testaceous, and are found in damp places, in woods, on the banks of rivers and streams, or near the coast, under stones and moss, in flood refuse, &c.

The larva of *P. excavatus* is figured by Schiödt, iii., Pl. xxi., Fig. 1, pupa, Fig. 6; it very much resembles that of *Anara coarctoscula*; the head, however, is longer and more produced in front; it has two short and very deep sulci on the vertex behind eyes; its colour is rufo-piceous with the mandibles red, and it is plainly reticulate; the prothorax is subquadrate with angles rounded; the dorsal scuta of the thoracic and abdominal segments are all smooth, chiefly castaneous, those of meso- and meta-thorax being fuscous on disc; the body is reddish; the muscular impressions are round and deep on all the scuta except that of prothorax; the anal appendage is rather slender, and the cerci moderately long and incurved; the legs are rather long, pale with the apex of the joints infusate, claws equal. Thomson, Skand. Col. i. 213, also gives a long description of this larva.

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| I. Thorax as long as broad; elytra about three times as long as thorax; insect apterous. | |
| i. Head smooth; third interstice of elytra about as broad as second | <i>P. EXCAVATUS</i> , Payk. |
| ii. Head transversely wrinkled; third interstice of elytra plainly broader than second | <i>P. ASSIMILIS</i> , Chaud. |
| II. Thorax broader than long; elytra about four times as long as thorax; insect winged | <i>P. SEPTENTRIONIS</i> , Dej. |

P. excavatus, Payk. Apterous, pitchy black, sometimes lighter, underside reddish; head with a deep furrow on each side near eyes, but nearly smooth, as a rule, between these, antennae ferruginous; thorax rather elongate, cordiform, posterior angles sharp, prominent, dorsal furrow distinct, entire, anterior margin more or less punctured in the centre, base with two strongly punctured, deep, large foveae; elytra long oval, with shoulders much rounded, broader behind than in front, rather finely striated, the striae thickly and finely punctured, continued plainly to apex, but feebler towards apex and at sides; legs red. L. 7-8 mm.

Common and widely distributed throughout the greater part of England, except in the extreme south; in Scotland it is widely distributed as far north as the Moray

district, but is not common, and is confined to the Lowlands; Ireland, near Belfast and Dublin: specimens from mountains and moors are darker as a rule, and smaller than those found in woods, &c., and are probably intermediate forms between this and the succeeding species.

P. assimilis, Chaud. (*claripes*, Thoms.). Apterous, pitchy black; very like the preceding, of which it is in all probability merely a highland variety; it is, however, smaller, with more convex thorax, and with the forehead strigose between the frontal furrows; the thorax also is somewhat narrower at the base; the striæ of the elytra are almost or nearly evanescent at apex, and the third interstice is much wider than the second, and the sculpture of the disc is a little stronger: as, however, intermediate varieties occur, it is sometimes hard to separate these species, and it would perhaps be the best course to class them together as, at all events, races of one species. L. $7-7\frac{1}{2}$ mm.

Rather widely distributed, but always on moors or in hilly and mountainous districts; Cannock Chase; Matlock and Hathersege Moor, Derbyshire; Snowdon and other Welsh mountains; Northumberland and Durham district, Wallington (Power); Mr. Bold says (Cat. p. 7) that his own local examples recorded as here cited proved to be small dark examples of *excavatus*. Scotland, common in the Highland districts throughout the country, but not found in the Lowlands: this latter fact, compared with the Scotch record for *P. excavatus* above given, goes a long way to prove that this species is nothing but a highland race of the preceding.

P. septentrionis, Dej. Winged, larger and longer than the two preceding; pitchy black or with the head and thorax pitchy and the elytra reddish testaceous; antennæ pitchy red; thorax broader than long, with the posterior angles sharp, prominent, dorsal furrow and foveæ much as in the other species; elytra longer and with the shoulders considerably more strongly marked, striæ almost obsolete towards apex and sides, punctuation of striæ feeble, almost obsolete; legs ferruginous; underside not so thickly or deeply punctured, sides of metathorax (which are plainly punctured in the others) almost smooth. L. 9 mm.

This is rather a variable species, as may be seen from the list of named varieties appended to it in the European catalogue: it is entirely a northern species; there is one record from near Wakefield, Yorkshire, but this is probably an error; it is somewhat widely distributed but not common in the Highland districts of Scotland (Tay, Dee, Moray, Solway, Clyde).

POGONUS, Dejean.

This genus comprises about thirty species, of which about half belong to Europe; the remainder occur chiefly in Northern Asia and North America, a very small proportion only being found in the southern hemisphere; they inhabit damp localities, and are never found except where there is salt; they occur, therefore, in salt marshes near the coast, on the shores of salt lakes, or at the mouths of tidal rivers, under stones, refuse, &c., and especially in cracks in expanses of mud, from which they emerge in bright sunshine.

I. Thorax metallic green, elytra yellow testaceous; antennæ red **P. LURIDIPENNIS**, Germ.

II. Upper side entirely bronze; antennæ dark.

- i. Striæ of elytra as plain at apex as at base; elytra parallel-sided *P. LITTORALIS*, Duft.
- ii. Striæ of elytra much weaker at apex; elytra slightly ovate *P. CHALCEUS*, Marsh.

P. luridipennis, Germ. (*Burrellii*, Curt., Fig. Brit. Ent. i. 17). Very conspicuous by its bright-green head and thorax and testaceous elytra, which are sometimes slightly clouded on disc; antennæ and palpi testaceous; thorax short, sides rounded to behind middle and thence nearly straight to base, posterior angles sharp, dorsal furrow distinct, base depressed and punctured, with two broad foveæ near angles bounded by a longitudinal fold; elytra rather broad, with punctured striæ; underside bronze-green; legs testaceous. L. 6-7 mm.

Rare; first discovered in England by Rev. J. Burrell at Salhouse on the Norfolk coast in 1806; Whitstable and Shoreham (Champion); Sheerness (salt-marshes, June, S. Stevens); Hastings; Sandwich; Deal; Pegwell Bay (Matthews); Lynington Salterns; apparently it used to be very common in the Island of Sheppy, but of late years it appears to have become very rare in that locality.

P. littoralis, Duft. Dark bronze, usually with a slight greenish reflection; antennæ fuscous black; thorax somewhat transverse with sides considerably more dilated and rounded in front than in the preceding species, slightly narrowed behind, posterior angles distinct but not projecting, dorsal furrow distinct, abbreviated in front, base depressed and strongly and rugosely punctured, basal foveæ deep, rugose, bounded by a longitudinal fold; elytra rather broad, parallel-sided, striæ punctured, strong and well defined to the extreme apex, the punctures however ceasing behind middle; legs ferruginous, femora dark. L. $6\frac{1}{2}$ – $7\frac{1}{2}$ mm.

Local but not uncommon; Whitstable, Gravesend, Sheerness, Clatham, Deal, Hastings; Margate; Portland; Isle of Wight; Lynington Salterns; North Devon; apparently confined to the more southern portions of England.

P. chalceus, Marsh. Bronze, or brassy, sometimes bluish or greenish, or almost black, shining; smaller than the preceding, and distinguished from it by having the striæ of the elytra distinctly feebler towards apex, and by the fact that the sides are more rounded; the sides of the thorax are less dilated in front, which give it the appearance of being somewhat longer, and the posterior angles are slightly sharper; in other respects the two species are very similar, but there can be no question as to their being distinct. L. 6 mm.

Common and widely distributed along the coasts of England towards the south, but much rarer towards the north. I have never taken a specimen on the Lincolnshire or Yorkshire coast, and only one locality is recorded from Northumberland; Scotland very local, Forth, Tay, Solway; Ireland, Baldoyle and Portrayne, Dublin.

TRUNCATIPENNES.

The Truncatipenne series contains a large number of exotic forms, of which, if we except perhaps the Dromius group, only comparatively few

are represented in the European fauna; the Odacanthina, for instance, are represented by one genus and one species, the genera *Casnomia* and *Calophaena* being entirely absent; the Dryptina are only represented by two genera (*Zaphium* and *Drypta*) and four species, of which we possess one; the genus *Brachinus* contains a fair number of species (about a sixth part of those known), but the large genus *Pheropsophus* is represented by one only; of the two hundred or more species of *Lebia* about a dozen only are European, and many of the allied genera (e.g. *Catascopus*, &c.) are altogether exotic.

The series is distinguished by the fact that its members have the apices of the elytra more or less truncate; there are, however, several transitional forms concerning the position of which there has been considerable dispute: we possess but one of these as British, viz. *Masoreus*. According to Mr. Bates (Biol. Cent. Am. Carabidæ, p. 152, &c.), before the true *Truncatipennes* come the subdivisions *Subtruncati* containing *Ega* and its allies, and the *Obtusipennes* containing the *Ctenodaetylinæ*.

The tribes, as far as our fauna is concerned, may be divided as follows:—

- I. Head with two supra-orbital setæ.
 - i. Tibial spurs long; thorax transverse, with sides rounded, not cordate or cylindrical MASOREINA.
 - ii. Tibial spurs short; thorax cylindrical, or more or less cordiform.
 1. Intermediate tibiæ of male occasionally dilated and squamulose beneath CYMINDINA.
 2. Intermediate tibiæ of male never dilated and squamulose beneath.
 - A. Penultimate joint of labial palpi bisetose.
 - a. Head prolonged behind eyes, joined to thorax by a semi-globular neck ODACANTHINA.
 - b. Head not prolonged behind eyes; neck not semi-globular.
 - a*. Basal joints of antennæ glabrous; apex of elytra not membranous; paraglossæ, as a rule, hardly exceeding ligula LEBIINA.
 - b*. Basal joints of antennæ pubescent; apex of elytra membranous; paraglossæ slender and projecting far beyond ligula POLYSTICHINA.
 - B. Penultimate joint of labial palpi plurisetose DRYPTINA.
- II. Head with one supra-orbital seta BRACHININA.

As, however, the distinctions given above are in many cases rather scientific than of practical service, it is better to give as well the following table of those genera which are considered by some authors to form the *Lebiina* proper:—

- I. First joint of antennæ as long as the three following united; mentum somewhat orbicular DRYPTA, F.
- II. First joint of antennæ not elongate; mentum transverse.
 - i. Thorax elongate, cylindrical ODACANTHA, Payk.
 - ii. Thorax not cylindrical, usually more or less cordiform.

1. Basal joints of antennæ pubescent; apex of elytra membranous *POLYSTICHUS, Bon.*
2. Basal joints of antennæ glabrous; apex of elytra not membranous.
 - A. Penultimate joint of tarsi strongly bilobed.
 - a. Tarsal claws simple; paraglossæ projecting considerably beyond ligula, crescent-shaped *ÆTOPHORUS, Schm.-Goeb.*
 - b. Tarsal claws pectinate; paraglossæ not or hardly projecting beyond ligula *DEMETRIAS, Bon.*
 - B. Penultimate joint of tarsi not bilobed but plainly emarginate; tarsal claws strongly pectinate *LEBIA, Latr.*
 - C. Penultimate joint of tarsi simple.
 - a. Tarsal claws simple *LIONYCHUS, Wiss.*
 - b. Tarsal claws pectinate.
 - a*. Base of thorax with an indistinct fringe of short hairs; labial palpi of male sometimes strongly dilated and securiform; length 8-10 mm. *CYMINDIS, Latr.*
 - b*. Base of thorax without trace of fringe of short hairs; labial palpi always simple; length 6-6½ mm. at most.
- a†. Posterior tarsi with the last joint about equal to the first; base of thorax truncate *DROMIUS, Bon.*
- b†. Posterior tarsi with the last joint plainly shorter than the first; base of thorax extended behind posterior angles.
 - a†. Mentum not toothed *BLECHNUS, Mots.*
 - b†. Mentum toothed *METABLETUS, Schm.-Goeb.*

MASOREINA.

The Masoreina are distinguished by the long spurs of the tibiae and transverse thorax which is slightly produced in the middle of base; they are placed by Bates among the true *Truncatipennes*, to which group they certainly belong, although their elytra are only subtruncate; Horn, following Thomson, classes them with the *Anchomenina*, and regards them as separated from the *Anchomeni* by the slightly lobed base of thorax; they may be looked upon as a transitional genus (in which light Bedel evidently regards them, as he places them between *Olisthopus* and *Anchomenus* on the one hand, and the *Lebiina* on the other), but this may be more truthfully said of other undoubted *Truncatipennes*, e.g. genera of *Thyreopterinae*, which are exactly like *Anchomenina*, and can only be distinguished by dissection of the mouth.

MASOREUS, Dejean.

This genus comprises about twenty species, which are widely distributed over Africa, Asia, and Europe, two or three occurring in Java, one in Cuba, and one in the Canary Isles; they live in sandy districts, and are found usually at the roots of grass and plants or under stones in sand-hills and other dry localities; we possess but one species, which when alive has very much the appearance of a large *Trechus minutus*.

M. Wetterhalli, Gyll. (*luxatus*, Dej.). Pitchy red, shining, margins of thorax (occasionally) and base of elytra ferruginous; head much narrower than thorax, antennæ and palpi red; thorax short and broad with sides completely rounded from apex to base, posterior angles very blunt, almost rounded, dorsal furrow fine, anterior and posterior margins about equal in breadth; elytra ovate with fine and finely punctured striæ, interstices smooth; legs red. L. 5 mm.

Very local and usually rare, but it is by no means uncommon at Deal and on the Chesil Bank, Portland, in which latter locality Mr. J. J. Walker has taken it in some numbers this summer (1885); Sheerness; Southend; Weymouth; St. Osyth, Essex; Hunstanton, Norfolk, where I have taken it very rarely on the sand-hills. I know of no locality further north.

CYMINDINA.

The species that form this tribe (which contains only two or three genera besides *Cymindis*) are distinguished from those of the neighbouring tribes by the truncate apical joint of the labial palpi, which in the males of many species are dilated and securiform; the occurrence of numerous species with the middle as well as the anterior tarsi of the male dilated and furnished beneath with squamæ, shows clearly that *Cymindis* and its allies form a sub-type quite distinct from the Lebiina, with which Lacordaire and Schaum combined them. (See Bates, Biol. Cent. Am. Carabidæ, p. 186.)

CYMINDIS, Latreille. (*Tarus*, Clairv.)

This genus comprises, according to the Munich Catalogue, a hundred and twenty species, but their number is probably exaggerated, as many of them are subject to variation (M. Bedel, for instance, says (l. c. p. 118) that *C. acillaris* has received twenty different names, and that in all the Europeo-Mediterranean region not more than thirty species are really known, although their number has been generally reckoned at about fifty); they chiefly occur in Europe, Northern Asia, and North America, but a few species are found in the southern hemisphere: we only possess two species, which may be distinguished as follows:—

1. Upper surface shining; elytra black with humeral patch and margins yellow *C. AXILLARIS*, F.
2. Upper surface dull; elytra dark brown, red brown at base *C. VAPORARIORUM*, L.

C. axillaris, F. (*homagrica*, Duft., *angularis*, Steph.). Head large, black, shining; antennæ and palpi ferruginous; thorax dark ferruginous with the rather broadly raised margins lighter, about as long as broad, wide in front and rounded and narrowed behind, posterior angles very minutely projecting, rugose and punctured, especially on the sides, dorsal furrow fine, basal foveæ distinct; elytra depressed, deeply striated, interstices with an irregular row of punctures in each, third stria with three or four large pores, black, shining, not pubescent, with margin and a narrow oblong spot at shoulders yellow; legs red. L. 8–10 mm.

Chalky hill-sides, under stones and at roots of grass; local, but not uncommon; Box Hill, Reigate, Mickleham; Isle of Wight; New Forest; Lewes; Swanage; Portland; Portsmouth; Weymouth; Lowestoft; Swansea.

C. vaporariorum, L. (*basalis*, Gyll.). Dull, somewhat pubescent; head and thorax black or dark brown, thickly and coarsely punctured, antennae and palpi ferruginous; thorax convex, cordiform, much more strongly punctured and more contracted behind than in the preceding, posterior angles sharp, projecting, dorsal furrow and basal foveae feeble; elytra black with the base reddish brown, plainly striated, the interstices thickly and coarsely punctured in two irregular rows; legs red. L. 8-10 mm.

Moors, mountains, and high districts, under stones, at roots of trees or herbage, &c.; very local and not common; Llangollen; Midgley Moor, Halifax, and Tees district, Yorkshire; Heswell, Cheshire; Liverpool district; Cannock Chase; Twizell Moor, Northumberland. Scotland, local, Highlands and mountains, Tweed, Forth, Dee, and Clyde districts (Braemar, Aviemore, Paisley, &c.). Ireland, Donegal.

ODACANTHINA.

A large number of exotic species are contained in this tribe which are remarkable for their large heads and long thorax, the large genus *Casnonia* being especially noticeable; from the Dryptina as usually constituted, and from the Brachinina the tribe is distinguished by the fact that its members have the penultimate joint of the labial palpi bisetose in front and not plurisetose: if, however, we admit *Polystichus* (in which it is bisetose) among the Dryptina, and this seems, although doubtfully, to be its proper place, it is difficult to find a distinguishing character that will hold universally. As Mr. Bates, however, has separated off *Egga* and its allies (in which the globular or semi-globular neck so characteristic of *Odacantha* is feebly marked or obsolete) under a subfamily Lachnophorinae, this character (the possession of a more or less cylindrical neck) will separate the tribe before us from all the other true Truncatipennes with bisetose penultimate joint of the labial palpi, except *Agræa*, which may at once be distinguished by the strongly securiform last joint of the labial palpi. The two other tribes which have been classed with this group of the Truncatipennes do not really belong to the true Truncatipennes at all; these are the Ctenodaetylina, which have the elytra rounded at the apex and entire, and which for other reasons besides this fact Mr. Bates places under a separate subdivision Obtusipennes, and the Mormolyceina which seem to form a distinct type of Carabidae altogether.

ODACANTHA, Paykull.

Four species only belong to this genus, one from Burmah, another from Senegal, a third from Japan, and the fourth from Europe; this latter is the sole representative of the tribe in the European fauna; they are found in marshy and reedy places on the banks of lakes and swamps.

Westwood (Classif. i. p. 77) records the capture of many hundred specimens of our species under the bark of trees growing in the water, in Italy, in a district where the insect had been very scarce.

O. melanura, Payk. Head and thorax dark bluish green, elytra testaceous with the apex bluish-black or violet; head very large, much produced behind eyes, and gradually narrowed to base, antennæ fuscous with first three joints and base of fourth testaceous; thorax very elongate, cylindrical, much narrower than head, coarsely punctured and rugose, with plain dorsal furrow, very narrowly margined; elytra elongate, parallel-sided, with rows of fine punctures, which are more or less obsolete; legs testaceous, knees and more or less of the tarsi pitchy. L. 6 mm.

Marshy places, among reeds; also in stems of *Typha* in winter; common in the fen districts of Cambridgeshire and the neighbouring counties (Whittlesea Mere, Horning Fen, Wicken Fen, &c.); Earlswood and Merton, Surrey; Birchington, Margate; Dagenham, Essex; Balcombe, Sussex; Shipley, Horsham; Ilford, Essex; Manningtree; Woodbastwick, Norwich; Swansea, Crymlyn Bog; formerly found in Hammersmith Marshes; not recorded from the north of England, Scotland, or Ireland, but it probably occurs in many more localities and districts than have been hitherto known.

LEBIINA.

This tribe, as here constituted, contains *Lebia*, *Dromius* and its immediate allies *Acetophorus* and *Demetrius*, and also *Metablitus*, *Blechnus*, and *Lionychus*; in many points these genera differ widely *inter se*, but a further revision of the whole group is necessary before they can be properly subdivided: this point will be found again alluded to in the introduction to the genus *Dromius*; for the present the tribe must be regarded as more or less unformed, and provisional.

LEBIA, Latreille.

The genus *Lebia* comprises a large number of species (over 200), which are widely distributed throughout the world, but occur more especially in tropical regions; they are usually bright-coloured, handsome insects, although not large sized; they are found under stones and in moss, also under bark, and on flowering shrubs (such as broom, &c.): their habits are carnivorous, and their presence on the plants is probably to be accounted for by their prey inhabiting the leaves and flowers. Of our five species two are extremely doubtful as British.

- . Elytra metallic, green, blue, or violet (LAMPRIAS, *Bonelli*.)
- i. Antennæ with the first joint reddish; elytra slightly pubescent; scutellum dark L. CYANOCEPHALA, *L.*
- ii. Antennæ with the first three joints reddish; elytra smooth; scutellum red L. CHLOROCEPHALA, *Hoff.*
- II. Elytra not metallic; prevailing colour orange, testaceous, or reddish (LEBIA, *i. sp.*)
- i. Palpi black L. CRUX-MINOR, *L.*

ii. Palpi reddish testaceous.

1. Striae of elytra indistinct; interstices flat . . . *L. HEMORRHOIDALIS*, *F.*
2. Striae of elytra well marked; interstices convex . . . *L. TURCICA*, *F.*

***L. cyanocephala*, L.** Head, breast, abdomen and elytra bluish green, blue, or violet, shining; head thickly punctured, antennae black, basal joint reddish, sometimes darker on upper surface; thorax testaceous red, short and broad, diffusely punctured, with sides rounded in front, contracted at base, posterior angles prominent; scutellum dark; elytra broad, widened behind, with feeble punctured striae, interstices punctured; base of femora and central portion of tibiae red, the rest black or pitchy, with a more or less metallic tinge. L. 5-7 mm.

Very local and not common; chalky places, under stones, in moss, &c.; occasionally taken by sweeping *Hypericum*; chalk-hills near Reigate, especially Buckland Hill; Mickleham; Ripley; Darenth Wood; Dover; Bournemouth; near Darlington, Yorkshire.

***L. chlorocephala*, Hoff.** Easily distinguished from the preceding by having the first three joints of the antennae,* the entire femora, the breast, and scutellum red; bright green or greenish-blue; thorax rather longer than in the allied species, with sides rather more contracted behind; the elytra are more finely punctured, but in this point there is some variation in different specimens; legs red, tarsi and base of tibiae fuscous black. L. 4-7 mm.

Under stones, and in moss; also found on broom and beneath junipers; Kent (Folkestone, Chatham, Dartford, Rainham); Surrey (Reigate, Ripley, Caterham, Walton-on-Thames, Shirley, Box Hill, Kenley (occasionally in abundance beneath junipers in winter)); Lewes; Hastings; Tonbridge; New Forest; Dorset; Bournemouth; Bath; Seaton, Devonshire; Swansea; Bentley, Suffolk; St. Oysth and Colchester, Essex; Repton, Burton-on-Trent; Church Stretton, Cheshire; Yorkshire, widely distributed; Northumberland and Durham; Scotland rare, about broom, but occurs from the Solway to Sutherland in Lowland districts; also found in Ireland, Armagh, &c.

A small and constant race of this species which is found at Shirley, Birch Wood, Higham (Kent), and other places, is perhaps identical with *Lebia chryscephala*, Mots., which is said to be of the same colour and build as *L. chlorocephala*, but smaller, with the elytra a third shorter, and the thorax less transverse; there is also a difference in the punctuation of the interstices, but in the species of the sub-genus *Lamproloma* this cannot be relied upon as a character, as has been shown above. Dr. Power once took eighty specimens of this variety at Gamlinghay near Cambridge, without taking one of the type form.

***L. crux-minor*, L.** Head black, strongly punctured; antennae fuscous, with the first three joints and base of the fourth red; thorax reddish-testaceous, small, short, very transverse, posterior angles prominent; scutellum black; elytra broad, orange testaceous, with suture, a triangular patch round scutellum, a broad waved band just behind middle, and

* The third joint is usually more or less fuscous at apex.

extreme apical margin black; the extremities of the waved band are usually continued to apex, so that with the apical margin they completely enclose two light spots: varieties, however, occur in which the band is interrupted (as sometimes happens in *Panagæus*); striæ feeble, and very finely punctured, interstices with fine diffuse punctures, almost smooth; underside black, except of thorax which is red; legs red, apex of femora, and tarsi, pitchy. L. 5 6 mm.

Very rare; damp places in woods, &c.; it has been found in moss, beaten from broom, and taken "at sugar" by night; it also occurs under faggots and stones: Plumstead, Tonbridge Wells, Coombe Wood, Headley Lane, Crohamhurst Godalming, from all which localities in Kent and Surrey single examples have been recorded; the largest number of examples taken in any one place were found by Dr. Power at Holm Bush near Brighton, in May, 1857, and he probably would have found a considerable number more, had the ground not been flooded by a thunder shower; Basingstoke (W. J. Saunders); Dawson records Windsor, Bristol, Netley, Lymington, and Treneglos, Cornwall, as localities: in Scotland the species has occurred near Loch Lomond, and very rarely in the Clyde and Solway districts: this insect is widely distributed over Southern and Central Europe, Asia Minor and Siberia.

L. hæmorrhoidalis, F. (*marginata*, Fourc.). Red, elytra black or bluish black with the apex red, breast black; head and thorax finely punctured, the latter short, much dilated and rounded at the sides; elytra with the shoulders rounded and prominent, sides dilated behind middle, with feeble and feebly punctured striæ, interstices flat, diffusely and weakly punctured; third stria with two small pores; antennæ and legs testaceous. L. 4 mm.

"Netley, Shropshire, on broom, Rev. F. W. Hope," *Stephens*; Dr. Power has a specimen taken by Mr. Sidebotham, near Devizes; the species, however, is very doubtfully indigenous.

L. turcica, F. (*scapularis*, Fourc.). Smaller than *crux-minor*; head black, mouth, palpi, and antennæ reddish testaceous; thorax reddish with a deep central line, scutellum reddish; elytra black with a large reddish testaceous patch on the shoulders, and a very slender margin of the same colour extending to apex, deeply striated, interstices convex, these and the striæ themselves almost impunctate; breast and legs red, abdomen black, paler in centre; legs testaceous. L. 5 mm.

The claim of this species to be regarded as British rested for many years on four specimens reported to have been captured, many years ago, in Oakhampton Park. In the Ent. Mo. Mag. for June, 1883 (vol. xx., p. 8), a specimen is recorded as taken from birch stumps in a clearing near Guestling, Hastings, by Mr. Bennett; this specimen appears to be authentic, but further confirmation of the species is much needed.

ÆTOPHORUS, Schmidt-Goebel.

One species only is contained in this genus, and this is included by some authors under *Demetrias*; from the species of this genus it is distinguished by the quite simple claws of the tarsi, by the large projecting paraglossæ, and by the absence of a tooth in the emargination of the mentum.

A. imperialis, Germ. Winged, elongate, depressed; head black, large, narrowed in front and behind, antennæ testaceous; thorax reddish, elongate, cordiform, strongly narrowed behind, finely margined, posterior angles blunt; elytra somewhat wider than in the species of the following genus, testaceous, feebly striated, with two oblique streaks on each side of scutellum, and the suture itself until middle where it dilates into a lozenge-shaped spot, dark; there are also two dark spots near the margins behind middle, usually connected with the middle spot by two lines, the whole markings bearing a fancied resemblance to the double-eagle (hence its name *Acetophorus* or eagle-bearer); the third interstice is furnished with two pores; legs testaceous, penultimate joint of tarsi very strongly bilobed. L. $4\frac{1}{2}$ –5 mm.

Rare on reeds and herbage in fenny districts; Cambridgeshire, Huntingdonshire, and Norfolk Fens (Horning, &c.); marshes at the mouth of the Colne, near Colchester (W. H. Harwood); Dagenham and Ilford, Essex.

DEMETRIAS, Bonelli.

This genus comprises about eight species mostly from Europe and Northern Asia; they are distinguished from the preceding by having the tarsal claws pectinate or denticulate, the paraglossæ only reaching slightly beyond the lingua, and by the emargination of the mentum being furnished with a simple tooth; from *Dromius* they are at once separated, like the preceding, by the strongly bilobed penultimate joint of the tarsi.

1. Elytra with a common well-marked spot on apical third; wings none or rudimentary *D. UNIPUNCTATUS*, Germ.
2. Elytra with suture more or less dark, but with no defined spot; wings developed *D. ATRICAPILLUS*, L.

D. unipunctatus, Germ. (*monostigma*, Sam.). Elongate, apterous; head black, antennæ and palpi reddish testaceous; thorax reddish, cordiform, slightly margined, posterior angles very blunt; elytra testaceous with suture and a common spot black, feebly striated, third interstice with two pores; underside and legs testaceous. L. 4 – $4\frac{1}{2}$ mm.

At roots of grass, in moss, &c., also on rushes, on sand-hills, and in dry sandy places, as well as in marshes. Local, but not rare; Deal, Ramsgate, and various localities in the south and south-east; also Norfolk and Lincolnshire coasts and south-west Yorkshire; Cambridgeshire and Huntingdonshire Fens; Swansea and the western coast; local towards the north, and not recorded from the extreme north of England or from Scotland.

D. atricapillus, L. Elongate, winged; very like the preceding, but with no distinct spot on the elytra, and with the posterior angles of thorax more distinct; elytra feebly striated, some of the interstices near suture with rows of larger punctures, suture blackish; underside testaceous, meso- and meta-sternum blackish; legs testaceous. L. $5\frac{1}{2}$ –6 mm.

On herbage, especially nettles, in spring; in moss, amongst dead twigs in hedges, &c.; very common over the whole of England until towards the extreme north, where it becomes rare; it is not recorded from Scotland.

DROMIUS, Bonelli.

The species belonging to this genus are somewhat numerous, being upwards of a hundred in number; they are distributed over the whole world, but are chiefly found in the temperate regions; a small proportion live in the southern hemisphere, and these occur mostly in Chili, in which country and its adjoining districts several of the northern genera (e.g. *Carabus*) appear to repeat themselves; several also of the genera near *Dromius* are Chilian; the tribe has not yet been fully worked out, especially as regards the southern forms; the habits of the species are very different, some being found on plants or among refuse at their base or roots, others occurring in dry and stony places, others being confined to fenny localities, while one section are almost exclusively found under bark of trees: there are about twenty European species, of which we possess eleven as British; some of the species are winged and others apterous; the presence of wings is always shown in the testaceous species (and this applies also to the preceding genera) by a dusky patch around the scutellum.

Mr. Bates (l. c. p. 191) says that a group *Dromiides* is incapable of definition, including as it does such discrepant elements as *Acinopalpus*, *Dromius*, *Metabletus*, and *Demetrias*, and we may add *Ætrophorus* with its large and projecting paraglossæ; he is of opinion that *Metabletus* might well be classed with the Cymindina, "its ligula and paraglossæ being similar to those of that group, whilst *Dromius*, in spite of the non-extension of the paraglossæ along the apical edge of the ligula, cannot be far removed from *Plochionus*:" in *D. longiceps*, however, the paraglossæ are extended along the apical edge of the ligula; there are, however, a large number of exotic forms that require to be examined before a final arrangement can be made.

The larva of *D. quadrinotatus* is described and figured by Perris, Ann. Fr. 1862, p. 173, Fig. 502-509: it is 6 mm. in length, and resembles in general shape that of *D. agilis*; M. Perris found it on the pine in the cells of *Pissodes notatus*, devouring the larvæ of that beetle: a beautiful figure of the larva of *D. agilis* is given by Schiödte, vi., Pl. iv., Fig. 1; the head is very large, oblong, about the size and shape of the prothorax, with large powerful jaws; the abdomen is rather broad in the middle, narrower towards base and apex; the cerci and anal appendage are very short, the latter armed with two warty excrescences which can be exerted at will, and several strong hooks for climbing; the larva is setose, pale, with the head and all the dorsal scuta pale ferruginous, covered with darker scattered lines and markings; it lives under the bark of dead trees, and is very active; the larva of *D. 4-maculatus* much resembles the preceding, but is of a darker colour.

- I. Elytra at base about as broad as anterior margin of thorax.
 - i. Striæ very weak, obscurely punctured; head elongate, smooth *D. LONGICEPS*, Dej.
 - ii. Striæ plain, distinctly punctured; head not elongate, rugose *D. LINEARIS*, Ol.
- II. Elytra at base distinctly broader than anterior margin of thorax.
 - i. Elytra unicolorous dark red or brownish.

1. Elytra with a row of pores on both the 3rd and 7th interstices D. AGILIS, F.
2. Elytra with a row of pores on the 7th interstice only D. MERIDIONALIS, Dej.
- ii. Elytra more or less testaceous.
 1. Anterior testaceous markings of elytra not reaching side margins.
 - A. Thorax plainly broader than long; front of head entirely striated D. QUADRIMACULATUS, L.
 - B. Thorax plainly longer than broad; front of head smooth in centre D. QUADRINOTATUS, Panz.
 2. Anterior testaceous markings of elytra reaching side margins.
 - A. Head strongly contracted behind eyes; antennae with joints 5-10 short; thorax broader than long D. QUADRISIGNATUS, Dej.
 - B. Head gradually contracted behind eyes; antennae with joints 3-10 elongate; thorax at least as long as broad.
 - a. Elytra entirely testaceous; shoulders marked D. MELANOCEPHALUS, Dej.
 - b. Elytra testaceous with a more or less defined dark band; shoulders rounded.
 - a*. Thorax and elytra narrower.
 - a†. Thorax and abdomen pitch-black; dark markings on elytra ill-defined D. NIGRIVENTRIS, Thoms.
 - b†. Thorax and abdomen yellow or reddish yellow; dark markings on elytra well defined D. SIGMA, Rossi.
 - b*. Thorax and elytra broader; underside of abdomen and disc of thorax usually pitchy. D. VECTENSIS, Rye.

D. longiceps, Dej. Elongate, very like a *Demetrius*; head long and narrow, pitch-brown, antennae and palpi reddish testaceous, base of the former lighter; thorax longer than broad, with sides narrowed behind, and margins elevated, posterior angles obtuse, almost rounded; elytra long, narrow, somewhat widened behind middle, feebly striated, testaceous, with suture, and a spot behind middle into which the suture widens, fuscous; legs testaceous. L. 6-6½ mm.

Rare; confined to marshy and fenny localities; Horning Fen, Holme Fen, and Whittlesea Mere, and other localities in the eastern fen districts; among reeds and sedges both standing and cut; found like other fen insects in the sedge boats on the river Cam.

This species differs so much from the other *Dromii* in general appearance, and also in the fact that the paraglossae are united over the front of the lingua, forming a membranous rim round that organ, that it almost seems to form the type of a new genus, for which I would propose the name of *Paradromius*; I would not, however, venture to adopt it finally without a further examination of the genus.

D. linearis, Ol. Easily distinguished by its elongate narrow form and almost parallel-sided elytra; dark testaceous red, head pitchy red, antennae testaceous; thorax only slightly longer than head, and about the same breadth at its widest part, narrowed behind, posterior angles

right angles; elytra strongly striated, the striæ distinctly punctured, colour darker towards apex; legs testaceous. L. 4 mm.

In moss, amongst dead twigs, refuse, &c.; widely distributed and common throughout England; Scotland, widely distributed, Lowlands, but not common; Ireland, near Belfast, and Portmarnock, and probably widely distributed.

D. agilis, F. Head dark red brown, often blackish, strigose between the eyes; antennæ testaceous; thorax red brown with the margins, which are broad, lighter, as long as broad, somewhat narrowed behind, posterior angles blunt, disc strigose; elytra dark pitchy red, or red-brown, somewhat widened behind middle, disc rather depressed, obsoletely striated, with a row of pores on the third and also on the seventh interstice; legs testaceous. L. $5\frac{1}{2}$ –6 mm.

Under bark of beech, apple, &c., and among the damp herbage of river banks; local but widely distributed; it is rather rare in the London district, and other places, but is found all over the country; Scotland, common under bark, Lowlands, Tay, Dee, Solway, Clyde; Ireland, near Dublin.

D. meridionalis, Dej. Almost exactly like the preceding, but differs in having the thorax wider in front and more obliquely narrowed to base, with the posterior angles more obtuse, and especially in having a distinct row of pores on the seventh interstice, and none on the third. L. $5\frac{1}{2}$ –6 mm.

Found under the same circumstances as the preceding, but commoner; it does not, however, appear in the Scotch list at all, although it is recorded from various localities in Northumberland; Ireland, near Belfast and Dublin.

D. quadrimaculatus, L. Head blackish brown, finely striated between the eyes, mouth and antennæ testaceous yellow; thorax broader than long, reddish with darker disc, sometimes entirely red, margins broad, elevated, posterior angles very blunt, rounded or almost rounded; elytra black with two large testaceous patches before middle, and a large common one behind covering their apical portion, disc feebly but distinctly striated, sixth stria with a row of pores; underside of thorax and breast ferruginous, of abdomen black; legs testaceous. L. 5 – $5\frac{1}{2}$ mm.

Common and widely distributed throughout the kingdom under bark of various trees.

D. quadrinotatus, Panz. Much smaller than the preceding, and not so broad in proportion; head black with front of head smooth in the centre, only strigose near eyes, antennæ testaceous, a little darker towards apex; thorax pitchy brown with sides sometimes lighter, much more elongate than in the preceding, narrow, with posterior angles elevated and somewhat prominent, margins narrow; elytra fuscous black or brownish, marked as in the preceding species except that the apical spot is smaller and the anterior spots are not so sharply bounded with black at the margins; they are, however, always separated from them by a more or less narrow pitchy space; striæ feeble; legs testaceous. L. $3\frac{1}{2}$ –4 mm.

Under bark, generally distributed and common, but not so abundant as the preceding; Scotland widely distributed as far north as the Moray district, but not common; not recorded from Ireland, but probably occurs there.

D. quadrisignatus, Dej. Head black, smooth, mouth, palpi and antennæ testaceous, the latter shorter and with the joints distinctly less elongate than in the two preceding species; thorax quadrate, reddish, with the centre sometimes pitchy, only slightly contracted behind, posterior angles obtuse; elytra with very feeble traces of striae, shoulders well marked, fuscous, with two testaceous spots on each, an irregular one towards base, as a rule not quite reaching suture, and a smaller one at apex, the apical spots uniting at suture; legs pale testaceous. L. $3\frac{1}{2}$ mm.

Not common, under bark of oak, apple, &c.; Ashford, Reigate, Maidstone, Nutfield, Horsell, Wimbledon Park; Margate; Ruse, near Horsham; Grantchester; Athelstone; Weston, Oxfordshire (bark of firs); Cambridge; not recorded from the midland or northern districts.

D. melanocephalus, Dej. Head black, smooth; antennæ and palpi testaceous; thorax reddish, sometimes slightly clouded on disc, subquadrate, a little narrowed towards base, posterior angles distinct and elevated; elytra entirely testaceous, very feebly striated; underside reddish, abdomen often brownish; legs testaceous. L. $2\frac{1}{2}$ –3 mm.

Damp places, in moss, &c.; common and widely distributed throughout England; Scotland, rare, Lowlands, Tay, Solway; Ireland, near Belfast and Dublin, and probably widely distributed.

D. nigriventris, Thoms. (*fasciatus*, Dej., *oblitus*, Boield.). Head black, antennæ and palpi testaceous, apex of latter pitchy; thorax pitchy with the margins lighter, subquadrate, margins raised, especially behind, posterior angles blunt but distinct; elytra oblong more or less pitchy, with a pale patch covering the basal portion except just at suture, and an indistinct smaller patch at apex; in some specimens the spots are cloudy and confused, and run more or less the one into the other; striae exceedingly feeble, sometimes almost obliterated; underside pitchy black; legs testaceous. L. 3 mm.

Sandy coasts, and banks of rivers; also on banks of ditches, and in hedge bottoms; local, but common where it occurs, and widely distributed. Gravesend, Sheerness, Chatham, Whitstable, Walton-on-Thames; Eastbourne, Weymouth, Lymington, and other places on the south coast; Essex; Scarborough; Devonshire; Cheshire; Liverpool; Northumberland and Durham; Scotland, scarce, Lowlands, Tweed, Tay, Forth, Moray; Ireland, near Dublin, &c.

D. sigma, Rossi. Very like the preceding in shape and size, but much lighter, with the dark markings on the elytra well defined; the thorax also is much lighter, being usually unicolorous testaceous red without any darker shade on disc; the elytra are clear testaceous with a dark transverse toothed fascia behind middle; the suture also is more or less dark; the abdomen, instead of being pitchy, is yellow or reddish yellow, sometimes slightly fuscous at margins; antennæ, palpi, and legs entirely testaceous. L. 3 mm.

Rare; confined to fens and marshy places; formerly taken in numbers with *D. longiceps* in the sedge boats on the Cam, and Whittlesea Mere; Rusper, near Horsham; Westerham, Kent (Gorham); Dorking; Staines; Amberley; Egham (banks of Thames, Champion); Scarborough (R. Lawson) and Askham Bryan, Yorks; Dawson records it from North Wales and Carlisle.

D. vectensis, Rye. (*sigma* var., Dawson and others). Fig. with elytra of *D. sigma*, Ent. Ann. 1874, Front. Closely allied to the preceding, but more robust and wider generally; antennæ shorter and stouter; thorax somewhat more transverse; elytra wider and comparatively shorter with the sides less parallel; the transverse band on the elytra is always wider, nearly always reaching more broadly up the suture towards the scutellum, so as to leave a lesser testaceous space at shoulders, and invariably extending downwards on the outer side, almost (if not quite) to apex, leaving only a small pale spot on each next suture, instead of a broad patch as in *sigma*; thorax often pitchy on disc, abdomen more or less pitchy. L. 3 mm.

Usually occurs on sandy coasts and banks of rivers, but is also found under bark and in dead leaves, flood refuse, &c.; banks of the Medway at Chatham; banks of the Thames, Gravesend and Sheerness; Rochester; Bexley; Forest Hill; Weymouth; Isle of Wight (Luccombe, Ventnor, Sandown, amidst stones and herbage on the sides of the cliffs); Seaton (Power): in habitat as well as structure and colouration it differs considerably from *D. sigma*; in some respects it comes near *D. nigriventris*, but the latter is distinguished by its slighter build, and much less defined and very variable dark fascia on the elytra.

This species is the *D. oblitus* of Crotch's Cat. Brit. Col., and also of Sharp's Cat. Brit. Col. (1st Edition), but it is not the *D. oblitus* of *Boieldieu*, which must be referred to *D. nigriventris*. (Vide Ent. Mo. Mag. x. 73.)

BLECHRUS, Motschulsky.

This genus comes very close to *Metabletus*; it is chiefly distinguished from it by the fact that the species have no tooth in the emargination of the mentum, whereas the species of *Metabletus* have the emargination plainly denticulate: the differences, however, are rather specific than generic, and several authors include *Blechrus* under *Metabletus*; in the genus *Blechrus* proper there are some sixteen or seventeen species which are rather widely distributed, being found in Europe, North Asia, North America, Egypt, Algeria, Madeira, and Cuba: they are small shining insects, and run with great rapidity in the sunshine on the sides of clayey or sandy cliffs, and on grassy paths, usually near the coast.

B. maurus, Sturm (*glabratus*, Woll., nec Duft.). Dark bronze black, very shining; head large, smooth; thorax with the anterior margin about as broad as head with eyes, narrowed from behind anterior angles to base, posterior angles blunt, almost obsolete, but distinctly traceable under a high magnifying power; elytra depressed, glabrous, with the shoulders rather marked, abbreviated behind and leaving the apical portion of the abdomen uncovered; antennæ, palpi, and legs black, the latter sometimes pitchy. L. $2\frac{1}{2}$ mm.

Under stones, moss, refuse, &c., also running in the sun; generally distributed and common in the south, but not found towards the north or in Scotland; it usually occurs in or near the coast.

B. glabratus, Duft., which has been in the British lists, is not indigenous: it is a larger insect, with the thorax a little less contracted behind, and with the elytra more parallel, and rather longer; it belongs to Southern Europe.

METABLETUS, Schmidt-Goebel.

About two dozen species are contained in this genus, which come from much the same countries, and are found under very much the same circumstances as the species of *Blechnus*, which they rather closely resemble in size and general appearance; about half the species are European, of which we possess three as British.

- I. Elytra with two impressions or pores on the third stria *M. FOVEOLA*, Gyll.
- II. Elytra without impressions or pores on the third stria.
 - i. Elytra oval, unicolorous *M. TRUNCATELLUS*, L.
 - ii. Elytra oblong, with a very obscure yellowish spot at shoulders, and sometimes also at apex *M. OBSCURO-GUTTATUS*, Duft.

M. foveola, Gyll. Obscure brassy brown; apterous; head large, smooth, antennæ black; thorax short, with anterior margin hardly broader than head with eyes, contracted from behind anterior angles to posterior angles which are obtuse and somewhat elevated; elytra somewhat widened behind, moderately rounded at the sides, feebly striated, with two distinct pores on the third stria; legs black or slightly pitchy. L. 3 mm.

Sandy places, at roots of grass, &c.; common and widely distributed throughout England; Scotland local, Lowlands, but widely distributed; Ireland, Portmarnock, &c.

M. truncatellus, L. Shorter and smaller than the preceding without any brassy tinge, and without any pores on the third stria of the elytra; apterous; thorax shorter, with anterior margin slightly emarginate, more rounded at the sides, and with the posterior angles very blunt almost rounded off; elytra shorter and slightly wider, apex very wide, disc obsolete striated; legs black or pitchy. L. $2\frac{1}{2}$ mm.

Sandy places, at roots of grass, &c.; local but not uncommon where it occurs; Sheerness, Dulwich, Chatham, Reigate, Croydon; Staines; Walton-on-Thames; Deal and Pegwell Bay; Hastings; Ganvilles Wootton; Colechester; Tonbridge; Salford Priors; Bewdley; Cannock Chase; I know of no locality for this species in the northern counties, and think with Dr. Sharp that the one Scotch record, "Cramond, Murray," is probably a mistake; Ireland, Portmarnock (Haliday).

M. obsкуро-guttatus, Duft. Winged, obscure brassy brown each elytron with a very obscure light spot at shoulder and occasionally another at apex; thorax much as in *M. foveola*, but with the sides and posterior angles slightly more rounded; elytra with the apex obliquely

truncate, feebly striated ; tibiæ and tarsi testaceous, femora darker. L. 3 mm.

Damp places, in moss, under refuse, &c. ; local, but not uncommon in the south and midland districts ; apparently not found in the north or in Scotland ; Lee, Sheerness, Chatham, Tonbridge Wells, Reigate, Dulwich, Lewisham ; Weymouth ; Hastings ; Glanvilles Wootton ; Isle of Wight ; Colchester ; Slapton Ley, Devon ; Salford Priors ; Bewdley ; Norfolk ; Berkshire.

LIONYCHUS, Wissman.

This genus, as its name implies, is separated from the preceding by the simple and smooth tarsal claws : it contains nine or ten species, which are widely distributed over the Old World, representatives being found in India and Burmah, and also at the Cape of Good Hope ; they are all small, more or less brassy, with light spots on the elytra : in habits they resemble the *Bembidia*.

L. quadrillum, Duft. Shining black with a feeble bronze reflection ; antennæ black, with first joint brownish-red ; thorax with anterior margin plainly wider than head with eyes, rounded at the sides below the anterior angles, much contracted towards base, posterior angles small, acute, and prominent ; elytra broad and short, shoulders rather marked, with four distinct striae near suture, the outer ones obsolete, interstices finely shagreened, with a row of minute but plain punctures in each, each elytron with two yellow spots, one near shoulder, and another more or less obscure behind middle which is sometimes absent ; legs black. L. 3 mm.

Marshy places on the coast, under stones, &c., rare ; Sheerness ; Whitstable ; Southend ; Slapton Ley, Devon ; Lynton ; Raincliff Wood, near Scarborough, at roots of ash (R. Lawson).

POLYSTICHINA.

This tribe is distinguished by having the basal joints of the antennæ pubescent, the apex of the elytra membranous, and especially by its very long and slender paraglossæ ; it is, however, merely adopted here provisionally, as it is probable that *Polystichus* belongs to the Dryptina, being connected with them through the gradations *Diaphorus*, *Zuphium*, *Galerita*, *Planetes*, &c. From *Drypta* itself it differs very widely by its cordiform thorax, simple fourth joint of the tarsi, and comparatively short first joint of antennæ. One thing is certain, and that is, that it cannot be classed, as it is by Dr. Horn and others, with the *Helluonina*, from which tribe it is widely separated by its long membranous paraglossæ ; in *Helluo* these parts are corneous and merged in the ligula.

POLYSTICHUS, Bonelli.

Nine species of this genus are mentioned in the Munich Catalogue, but according to M. Bedel only three true species are known, two from Europe, and one from Central Asia ; very little is known about their habits.

P. vittatus, Brullé (*connerus*, Fourc., *fasciotatus*, Daws. G. Brit., *new* Rossi). Head and thorax pitchy brown above and beneath, elytra pitchy with a broad reddish testaceous patch extending on each side of suture from base to beyond middle; upper surface covered with yellow pubescence; head and thorax coarsely punctured, antennæ and palpi ferruginous; elytra depressed, parallel-sided, distinctly striated, interstices thickly punctured; legs and abdomen ferruginous. L. 9-10 mm.

Clay banks on the coast; also further inland at the foot of posts, under stones and clods, in flood refuse, &c.; Whitstable; Herne Bay; Hastings; Hythe; Walton-on-Naze; Southend; St. Leonards; Sheppv, generally distributed; Skeerness, occasionally common; in profusion in March, 1873, by digging about posts at Queenboro' (J. J. Walker).

DRYPTINA.

This tribe is rich in exotic forms, the genera containing the greatest number of species being *Galerita* and *Zaphium*; in Europe it is represented by two genera and six species, of which one only is British; several of its members have the head joined to the thorax by a semi-globular neck as in the *Odicanthina*, but from these and their allies they are distinguished by the penultimate joint of the labial palpi being plurisetose in front, and also in some cases by the elongate first joint of the antennæ; this point, however, cannot be depended upon as of tribal value, as some of the genera of the allied tribes have the first joint longer than some of the Dryptina.

DRYPTA, Fabricius.

This genus comprises upwards of thirty species from Europe, Asia, and Africa, one or two also being found in Australia; they occur chiefly in hot regions; as a rule they are very handsome insects; they live in either damp or dry places, near the sea or further inland, at the roots of grass, under vegetable refuse, &c.

D. dentata, Rossi (*emarginata*, F.). Bright green or blue green on both the upper and under sides; head thickly punctured, eyes prominent; mouth, palpi, and antennæ red, the apex of the first joint of latter (which is very elongate), and a ring round the second and third, black; thorax elongate, almost cylindrical, somewhat narrowed behind, very coarsely punctured, with distinct dorsal furrow; elytra rather wider behind middle, pubescent, with strongly punctured striae, interstices finely punctured. L. 8 mm.

Very local but has sometimes been taken abundantly; it is found on clay banks at roots of grass, &c., and occurs either near the coast or inland under vegetable refuse, moss, &c.; Gosport (in numbers); Portsmouth and Alverstoke; Portsea; Isle of Wight, Lucombe Chine and Freshwater, April 1885; Hastings; Eaversham; Chattenden (Kent); Lyme Regis; Chatham (a few specimens taken from moss in a wood in early spring by G. C. Champion and J. J. Walker).

BRACHININA.

This very distinct tribe is characterized by having the mesosternal epimera very wide, sometimes nearly as large as the episterna; in some cases the posterior coxæ are separated, the first ventral segment being visible between them, but this character is not universal in all the species; the most peculiar characteristic of the members of the tribe is their power of ejecting from the anus an explosive liquid, which volatilizes as soon as it reaches the air, and has caustic properties, producing an effect on the skin similar to that caused by nitric acid: an interesting account is given of this peculiarity in Westwood's Classification, vol. i. p. 76. Our common species of *Brachinus* possesses this property in a marked degree, and has hence been called the Bombardier beetle, but the effect produced is of course much more noticeable in the large tropical species: the members of the Brachinina have the abdomen with seven or eight visible segments instead of six as is the rule in the other tribes, but, as Dr. Horn points out, the importance of this fact has been much exaggerated; the explosive fluid ejected by *Brachinus* does not differ except in degree of strength and chemical action from that ejected as a means of defence by several other Carabidæ, and if we examine the species of any of the genera which emit a liquid whether explosive or not (e.g. *Galerita*, or any of the larger Dryptini), it will be seen that the structure in no way differs from that of *Brachinus*, except that the latter has a broader sixth segment, which being truncate, or slightly emarginate, allows the genital armature to become more plainly visible, and we thus count more segments. (See Horn, Carabidæ, p. 166.) Dr. Horn places the Brachinina at the head of his Harpalinae unisetosæ, but they evidently belong to the Truncatipenne series, from the rest of which, however, they differ in the fact that the head has only one supra-orbital seta, whereas in all the other genera it is furnished with two. M. Bedel considers them a separate sub-family.

BRACHINUS, Weber.

This genus contains about one hundred and fifty species, which are widely distributed throughout the world, a large proportion occurring in tropical regions; about twenty-five species are found in Europe, of which we possess three as British, two of which are doubtfully indigenous and require further confirmation: the species generally are of very uniform appearance and colour (red head and thorax and bluish elytra); they are found under stones and logs, at roots of grass, &c., often in large colonies.

I. Elytra unicolorous.

- i. Posterior angles of thorax sharp, projecting; striae on elytra broad and well defined, although shallow *B. CREPITANS, L.*
- ii. Posterior angles of thorax blunt; striae on elytra very feeble *B. EXPLODENS, Duft.*

II. Suture of elytra broadly red behind scutellum *B. SCLOPETA, F.*

B. crepitans, L. Head and thorax red, antennæ ferruginous, third and fourth joints more or less fuscous; head broad, eyes prominent; thorax in front about as broad as head with eyes, elongate, cordiform, strongly sinuate before posterior angles, which are prominent, disc rugose, dorsal furrow distinct, margins well defined; elytra black, bluish-black, steel blue, or greenish, slightly pubescent, dull, stria shallow, but defined, interstices punctured; legs ferruginous. L. 7-9 mm.

Under stones, at roots of grass, &c., on chalky hill-sides, on river banks, and on the coast. Local, but common in the south from Sheerness and Gravesend downwards; abundant in the Isle of Wight and many other southern localities; Swansea, Hertford, and Oxford (Curtis); Ireland, Wexford and Louth.

B. explodens, Duft. (var. *glabratus*, Dej.). Much smaller than the preceding; elytra shorter, more convex, blue or green, shining, the stria only feebly indicated or quite obsolete; the whole breast and abdomen is dark brown, whereas in *B. crepitans* the middle of the breast is more or less red; the third and fourth joints of the antennæ are spotted with black. L. 4-6 mm.

This is a common species on the Continent, but is very doubtful as British: three distinct specimens of different forms of this insect (which is very variable) are said to have been taken by a Lepidopterist who was collecting at random in Silverdale and Wastdale in June and July 1863 for Mr. Sidebotham (Ent. Ann. 1866, 59). I feel sure that there is some mistake about these beetles, especially as no Brachini have ever been recorded from the northern districts: as Mr. Rye remarks, "it is very curious that these three specimens should be *all* different."

B. sclopeta, F. Very like *B. explodens*, but distinguished by its red breast and abdomen, and the fact that the suture is broadly red from about middle to base; the elytra are more brightly coloured, usually blue, but sometimes greenish; the stria are faint but more distinct than in the preceding species; the interstices are feebly punctured; the antennæ are entirely and constantly red: examples sometimes occur in which the red sutural patch is very narrow. L. 4-6 mm.

Doubtful as British; at all events, it has not occurred for many years; Devonshire (Leach); Southend (Hope); Hastings, locality doubtful (Stephens); Mr. Matthews tells me that his specimens came from Sowerby, who took a small series "near Margate, Kent," in 1830, and gave some to his father at the time; he fully believes that they are quite authentic British specimens; the species, however, seems to have entirely disappeared from the county; it is, however, very common near Paris, and is spread widely over southern Europe, so there is no reason why it should not be found in our southern counties.

HALIPLIDÆ.

The Haliplidæ were formerly included among the Dytiscidæ, but their separation was suggested by Leconte, and has since been effected by Thomson and Sharp. The latter at the end of his work on the Dytiscidæ (p. 972) discusses the position taken up by Schaum with regard to them (Insect. Deutsch. i., pt. 2, pp. 9 and 10): this author include

them among the Dytiscidæ, but says "that their legs are not swimming legs in shape, but only by ciliation, and that they differ so much from the true Dytiscidæ in the insertion of the antennæ and the number of their joints that they could be erected into a peculiar family, were it not for the fact that *Pelobius* existed to unite the two groups together;" there seems, however, to be no real connection at all between *Pelobius* and the Halipilidæ; it is most probable that *Pelobius* ought not to be included in the Dytiscidæ at all, and it is, as Dr. Sharp points out, certainly an erroneous course to include the Halipilidæ in one family with the Dytiscidæ, and at the same time to keep these latter distinct from the Carabidæ; the peculiar construction of the posterior coxæ of the Halipilidæ, which are fixed and furnished with large plates covering the greater part of the abdomen, separates them at once from both families; they possess, it is true, in common with the Dytiscidæ, the peculiarity of glabrous antennæ (which are 10-jointed instead of 11-jointed as in the latter family), but this is probably only due to their manner of life and the element in which they live, and we need no more class them with the Dytiscidæ on this point alone than we should class a whale with a salmon because they both have their limbs modified into fins; if, however, it is clear that the Halipilidæ are to be separated from the Dytiscidæ, and there does not seem to be much doubt about the matter, they must be rather classed as a separate group of the Carabidæ, and further than this must be considered as completing the circle by being closely connected with the Cicindelidæ in the structure of the front of the head, and the insertion of the antennæ, the clypeus extending laterally in front of their insertions, instead of not extending so far towards the sides as their insertions, as in the Carabidæ.

It may be said, in conclusion, that if from the fact of their aquatic habits it is considered necessary to class the Halipilidæ with the Dytiscidæ, we might just as well class certain species of Curculionidæ among the water-beetles proper, notably those belonging to the genus *Phytobius* and its allies; *Eubrychius velatus*, for instance, is quite as aquatic in its habits as *Halipilus*, and swims with its hind legs after the fashion of a true Dytiscide.

Our genera of the Halipilidæ may be divided as follows:—

- I. Terminal joint of palpi small, subulate.
 - i. Thorax quadrate, with lateral impressed line *BRYCHIUS*, *Thoms.*
 - ii. Thorax narrowed in front *HALIPIUS*, *Latr.*
- II. Terminal joint of palpi conical, longer than the penultimate; thorax narrowed in front *CNEMIDOTUS*, *Ill.*

BRYCHIUS, Thomson.

This genus, which was separated by Thomson from *Halipilus*, comprises three species from Europe and one from California; they live in running water, and are found attached to sunken logs or to the sides of the banks in moss, &c.

B. elevatus, Panz. Pale testaceous; head thickly and finely

punctured, eyes somewhat prominent; thorax transverse, rounded in front, straight towards base, anterior and posterior margins sometimes fuscous, base with deep impressions; elytra with black plainly punctured stria, which become feebler at sides; third interstice raised into a keel until beyond middle, sixth interstice also raised towards base. L. $3\frac{1}{2}$ –4 mm.

Somewhat local but widely distributed throughout England from north to south in brooks and rivers; Scotland, common in rapid streams, Lowlands, Tweed, Forth, Solway, Clyde, Moray; Ireland, Dublin, Loughlinstown, and Armagh, and probably common. I have found it on logs in the Dove near Burton-on-Trent in company with *Macronychus* and *Hydroporus* 12-pustulatus.

HALIPLUS, Latreille.

This and the preceding genus are remarkable for the very small and subulate terminal joint of the palpi, in which point they resemble the Bembidiina, which on this account have been for a long time placed at the end of the Carabidae.

About forty or fifty species are comprised in the genus, which occur chiefly in Europe and North America, a very small proportion being found in China and Australia; they live in both fresh and brackish water, in stagnant ponds and also in running streams, attached to aquatic plants, &c.

The larvæ of *Haliplus* are very peculiar in their structure: those of *H. ruficollis* and *H. fulvus* are figured by Schödlte, ii., Pl. viii., Fig. 1 and 16.

The larva of *H. ruficollis* (Fig. 1) is linear, very long, somewhat cylindrical, and moultiform, the segments being contracted at apex and base, whitish or whitish yellow with the roughnesses on the corneous parts fuscous; the head is much narrower than the prothorax, which is large; all the dorsal scuta are furnished with a large longitudinal depression on each side, and have their posterior angles produced into a sharp point: in all except the ninth the basal space between the posterior angles is produced into four short equal obtuse teeth; the whole surface of the dorsal scuta as well as of the anal appendage is granulose; the anal appendage is very long, slender, and divided at apex into two setose processes; there are no cerci; the legs are rather long, and are terminated by simple claws; the larva is sluggish, and uses its whole body for locomotion as well as its legs.

The larva of *H. fulvus* differs very much in appearance from the preceding, each scutum being furnished with four large stout spines which are double as long as the segment that bears them, and point downwards towards apex; the anal appendage is as long as or longer than the whole of the abdominal segments, and is divided at the apex into two very slender setose processes.

The pupa of *H. variegatus* is figured by Schödlte with the above insects: it is rather short and broad, and furnished with short, stout spines.

I. Elytra with rows of feeble punctures.

- i. Base of thorax without an impressed longitudinal stria on each side
- ii. Base of thorax with an impressed longitudinal stria on each side

II. OBLIQUUS, F.

II. CONFINIS, Steph.

II. Elytra with rows of deep punctures.

- i. Base of thorax without longitudinal stria on each side.

1. Head broad; thorax not strongly contracted in front

II. MICRONATUS, Steph.

2. Head narrow; thorax strongly contracted in front.
 - A. Anterior margin of thorax truncate in middle; elytra pale yellow without dark spots; thorax with a distinctly defined row of large punctures at base *H. FLAVICOLLIS*, Sturm.
 - B. Anterior margin of thorax slightly produced in middle, sinuate; elytra (as a rule) reddish with dark spots.
 - a. Thorax with a distinctly defined row of large punctures at base; humeral angles not prominent.
 - a*. Form oblong-ovate; punctuation of anterior part of thorax distinctly feebler than of base *H. FULVUS*, F.
 - b*. Form short oval; punctuation of anterior part of thorax as strong as of base *H. VARIEGATUS*, Sturm.
 - b. Thorax without a distinctly defined row of large punctures at base; humeral angles prominent *H. CINEREUS*, Aubé.
- ii. Thorax with an impressed longitudinal stria on each side.
 1. Thorax without longitudinal black line in centre, its base not channelled.
 - A. Shoulders broader, colour darker, sides of elytra less parallel *H. RUFICOLLIS*, De G.
 - B. Shoulders narrower, colour lighter; sides of elytra more parallel.
 - a. Elytra with dark lines more or less interrupted by dark spots *H. FLUVIATILIS*, Aubé.
 - b. Elytra with dark lines never interrupted by dark spots *H. STRIATUS*, Sharp.
 2. Thorax with longitudinal black line in centre, its base deeply channelled *H. LINEATOCOLLIS*, Marsh.

H. obliquus, Er. (*amœnus*, Ol.). Testaceous, somewhat dull, whole upper surface extremely finely and thickly punctured; back part of head and middle of anterior margin of thorax (usually more or less) black or fuscous; thorax double as broad as long, strongly contracted in front, with rather diffuse and strong punctures in middle and at base; elytra at base broader than base of thorax, acuminate at apex, with rows of fine punctures which stand on interrupted black lines; viewed as a whole the base, suture, a broadly waved band across middle, and four spots (two on each elytron, usually confluent) just before apex appear black; legs testaceous. L. $3\frac{1}{2}$ mm.

Found both in ponds and ditches, and also in running water; somewhat local, but widely distributed throughout England; in Scotland it is rare, and only occurs in the Tweed and Forth districts. Ireland, Dublin and Armagh, and probably widely distributed.

H. confinis, Steph. (*lineatus*, Aubé). Very like the preceding, but distinctly broader at the shoulders, and usually of a darker reddish colour; it is easily distinguished from that species by the short longitudinal stria on each side of base of thorax; thorax entirely testaceous or with anterior and posterior margins more or less narrowly dark; elytra

very finely punctured with rows of larger but yet fine punctures set in black lines which, especially externally, are in places confluent and form spots; these, however, are not nearly as much pronounced as in the preceding species. L. $3\frac{1}{4}$ mm.

Local, but widely distributed; usually found in ponds and ditches; not uncommon in the London district: Gravesend, Earlswood, Wandsworth, Lee, Esher, Forest Hill; Horning Fen; New Forest; Norfolk; Suffolk; Knowle, near Birmingham; Hereford; Weston-super-Mare; Liverpool district; Northumberland district (Gosforth, Talkin Tarn, &c., not uncommon); Scotland, scarce, Lowlands, Tweed, Forth, Tay; Ireland, Armagh.

The insect captured by Mr. Bold in ponds near Newcastle-on-Tyne, and introduced by him as *H. varius*, Nicolai, is a variety of this insect (as stated by Mr. Rye, Ent. Ann. 1869, 14): I have not seen these specimens, and Mr. Bold's description (Ent. Mo. Mag. iv. 281) is very meagre; I believe, however, that the insects in Dr. Power's and Dr. Sharp's collections under *var. varius* are identical with them: these are pale testaceous with the thorax entirely testaceous; the black elytral lines are finer and are not confluent; they are also more or less evanescent towards base and externally, so that the elytra as a whole present the appearance of being furnished with light markings instead of the usual dark ones; the specimens which I have examined are also narrower than the ordinary form. According to Schaum, the true *varius* of Nicolai is very like *obliquus*, but always smaller, broader at the shoulders, and more rotundate, with the black lines on the elytra running here and there into spots; the anterior and posterior margins of the thorax are also dark, and the longitudinal striae at base of thorax are sometimes scarcely perceptible: as there is still some doubt about the insect we consider as a variety of *confinis*, which seems distinct from the true *H. varius*, it is better perhaps to adopt a different name for it than *v. varius*, which may cause confusion; I would therefore propose to call it *v. pallens*. The specimens in Dr. Power's collection are Scotch, two of them being from Loch Leven.

H. mucronatus, Steph. (*bulius*, Aubé, *parallelus*, Babington). Elongate, somewhat convex, more parallel-sided than the allied species; colour reddish testaceous; head short and broad, eyes large and prominent; thorax usually a little darker on anterior margins, where it is slightly produced in the centre, not strongly contracted in front, strongly punctured except on disc, but more strongly in front than behind; elytra with rows of strong punctures, interstices with rows of fine punctures, sides subparallel until behind middle, strongly acuminate at apex. L. 4–4 $\frac{1}{2}$ mm.

Rare; in ponds, &c., both fresh and brackish; not recorded from the London district. Weston-super-Mare (locally plentiful in early summer, but soon disappears); Swansen, Crymlyn Bog; Burton-on-Trent (very rare); Wicken Fen; Soham, Cambridge; Holm Bush, Brighton; Suffolk; Horsea.

H. flavicollis, Sturm (*impressus*, F.). This species and the suc-

ceeding are at once distinguished from *H. mucronatus* by having the sides of the thorax strongly contracted in front and the elytra much less parallel-sided, and also by the much smaller and narrower head; from the other species with strongly punctured elytra these may be separated by their superior size. *H. flavicollis* is of a lighter colour than either *H. mucronatus* or *fulvus*, and may be separated from the latter by its broader shoulders, and light testaceous unspotted elytra; the thorax also is less produced in the centre of its anterior margin and the thoracic punctures are blacker, but these distinctions are not very obvious. L. 4 mm.

Ponds and ditches; somewhat local, but widely distributed throughout England and Wales; not uncommon in the Northumberland district, but very local in Scotland, and apparently only found in the Solway district, where it is recorded as abundant in some pools by the side of the Nith below Thornhill. Ireland, near Belfast.

H. fulvus, F. (*ferrugineus*, Gyll.). Very like the preceding, but of a dark ferruginous colour, with darker spots on the elytra (which are very rarely absent); the shoulders are narrower than in *H. flavicollis*, which species hardly ever presents traces of spots on the elytra; the thorax has the anterior margin slightly produced in the middle. L. 4 mm.

Ponds and ditches; common and widely distributed throughout England and Wales, although rather local in some districts; Scotland, not common, Lowlands, but somewhat widely distributed as far north as the Moray district. Ireland, near Belfast and Dublin, and probably common.

H. variegatus, Sturm. Ferruginous, ovate; thorax with anterior margin more or less dark, somewhat strongly contracted in front, strongly punctured in front and behind, with a distinct row of large punctures at base; elytra convex, with base scarcely broader than base of thorax, sides of thorax and elytra viewed sideways forming a very open obtuse angle; the dark markings on the elytra are, as a rule, much more marked and more widely spread than in the other species, and the rows of large punctures are very strong, the interstices being furnished with rows of rather large punctures set at some distance apart. L. $3\frac{1}{3}$ mm.

Ditches, &c., both near the coast and inland; local; Wandsworth; Notting Hill; Deal; Hastings; Sheerness; Strood and Rainham; River Coln; Wicken and Burwell Fens and other localities in the fen districts of Cambridge, Huntingdon, and Norfolk; New Forest; Hornsea; Northumberland district, very rare; very doubtful as Scottish, there being only one record, "Dollar, J. T. Syme," *Murray's Cat.*; Ireland, one specimen, which I received from Mr. C. Donovan, taken near Cork; I can find no other record of the species as Irish, but it will probably be found in other places.

H. cinereus, Aubé (*affinis*, W. C.). This species is in general appearance intermediate between *H. flavicollis* and *H. ruficollis*: from the former it differs through its smaller size and more irregular punctuation of thorax, and also by the cloudy markings on the elytra, which, however, are sometimes absent in light specimens; the punctures also

on the elytra are closer, smaller, and more frequent in each stria; from *H. ruficollis* it differs by the absence of striae at the base of the thorax, and by having the apex of the elytra more rounded than in that species; from *H. variagatus* it may be at once separated by its lighter colour and less pronounced dark markings, the less coarse sculpture of the elytra, and the much more prominent shoulders, the angle formed by the sides of the elytra and thorax viewed sideways being much more pronounced; the first punctures (at base) of the first five rows on the elytra are as a rule much stronger than the others. L. $3\frac{1}{3}$ mm.

Ponds and ditches; not common; Lee, Earlswood, Peckham, Tottenham, Esher; Kingsbury; Soham, Cambridge; Swadham; Knowle, near Birmingham; Eggington and Repton, near Burton-on-Trent; Weston-super-Mare; Askham, York; Northumberland district, not common (Ouseburn, Heaton, Gosforth, &c.); Ireland, near Belfast; not recorded from Scotland.

H. ruficollis, De G. Ovate, ferruginous; head with base dark, diffusely punctured; thorax with anterior margin more or less dark, short, strongly contracted in front, rather diffusely punctured, more strongly at base, centre of disc smooth with a trace of a central furrow usually indicated; base with a plain longitudinal stria on each side; elytra at base broader than base of thorax, with the shoulders widened, strongly contracted to apex, with rows of rather strong striae set in black lines which in places are confluent and form dark spots. L. $2\frac{3}{4}$ mm.

Ponds and ditches; occasionally in running streams; abundant throughout the kingdom; not recorded, however, as yet, from the extreme north of Scotland.

H. fluviatilis, Aubé. This species comes near *H. ruficollis* but is lighter in colour, and the lines of the elytra although stronger in places and apparently forming spots are never confluent; it is also much narrower at the shoulders, and the elytra are less acuminate at apex, so that it appears more parallel-sided; these differences are rather hard to explain, but will at once be seen by comparing the two species. L. $2\frac{1}{4}$ mm.

Running streams, and not found in stagnant water like the preceding; usually considered common, but it is very often confounded with *ruficollis* in collections: London district, apparently rare, Wimbledon, Mickleham, Esher; widely distributed, but in all probability much less common than it is supposed to be in many districts; Scotland, very rare, in clear slowly moving water, Forth district (Muttonhole, Edinburgh, D. S.); Ireland, Armagh.

H. striatus, Sharp. "Equal in size to the small varieties of *H. ruficollis*, which it resembles in colour, but from which it may be distinguished by being much narrower at the shoulders, and by the black lines on the elytra showing no tendency to being dilated at any places into spots; also closely allied to *H. fluviatilis*, but to be distinguished from that species by its smaller size and darker colour, and by the black lines on the elytra being throughout of even width, whereas in *fluviatilis* these lines are sub-interrupted at places" (E. M. M. vi. 81). L. $2\frac{3}{8}$ mm.

Found by Dr. Sharp in great numbers in a pond on the banks of the Nith, about

three miles from Dumfries, which is occasionally filled by the tides, in company with *H. ruficollis*, and also by Dr. Sharp and Mr. Lennon in other localities near that town.

These three insects are in all probability races of one species: the extreme forms of *H. fluvialis* and *H. ruficollis* are very easy to distinguish, but, as Dr. Sharp (l. c. p. 81) and Mr. Rye (Ent. Ann. 1870, 44) admit, intermediate forms occur which it is impossible to assign to either; the latter states that he found *H. fluvialis* and *ruficollis* in great numbers in a running stream near Coombe Wood, accompanied by specimens which he could not refer to either, and also by other extraordinary vars. of the *ruficollis* type; the conclusion he arrived at was that the intermediate forms resulted from interbreeding between the extreme forms. *H. striatus* would appear to be a constant variety, of the intermediate type.

H. lineatocollis, Marsh. Resembling in shape *H. fluvialis*, but not so much pointed behind; at once distinguished by the dark longitudinal line in the centre of the thorax, and the horizontal depression at base; the elytra are rather narrow, subparallel, with sculpture and markings much as in the preceding species. L. $2\frac{3}{4}$ mm.

Ponds and ditches; also in clear water; common and widely distributed throughout the kingdom, as far north as the Moray district of Scotland.

CNEMIDOTUS, Illiger. (*Peltodytes*, Reg.)

This genus contains a few species, two of which are found in Europe; the rest occur chiefly in North America: its members are easily distinguished from *Halipplus* by the longer terminal joint of the palpi, and stand in much the same relation to that genus as *Trechus* to *Bembidium*.

The larva of *C. impressus* is figured by Schiöde, vi., Pl. viii., Fig. 1: it is perhaps the most extraordinary of all the Coleopterous larvæ, and is remarkable for the absence of spiracles, their place being taken by very long filamentous branchiæ which are jointed and are attached in pairs to the dorsal segments of the thorax and of the abdomen (except the ninth); they are not, however, inserted directly on the segment but on long spinous processes such as are found in the larva of *H. fulvus*; the anal appendage is obsolete; the ninth segment of the abdomen bears two very long jointed cerci, which equal in length the whole abdomen; the head is very small, appearing as a mere transverse strip, and the legs are long and furnished with simple claws; the colour is dull and pale with the head and dorsal scuta somewhat olivaceous; there are twenty-two pairs of branchiæ, each branchia being as long as half the whole body of the larva; they are pellucid towards apex, and the tracheæ may be easily traced in them under a high power. If anything were needed to prove the distinctness of the Haliplidæ, the study of their larvæ would certainly be sufficient without taking any other points into consideration.

C. impressus, F. (*casus*, Duft.). Reddish testaceous, elytra with a greyish tinge; head diffusely punctured, mouth and base dark; thorax punctured in front and at sides, disc smooth, base with a rather deep furrow which follows the course of the posterior margin, which is sinuous, and is furnished with a more or less regular row of large black punctures; on each side of base there is a small stria or depression set in a black

patch; elytra depressed on disc, with ten rows of large black punctures on each which become larger towards base, those at base being especially conspicuous; on the centre of the disc is a more or less distinct dark patch, and there are other indistinct dark markings towards apex. L. $3\frac{3}{4}$ –4 mm.

Ponds, &c.; local; Peckham, Putney, Lee, Gravesend; Whitstable; Deal; Hunstanton; Birchington; Devonshire (Exminster); has occurred, I believe, in Yorkshire; not recorded from the Northumberland district. Scotland, very rare, Clyde district ("Ayrshire," Hislop).

Between the Haliplidæ and the Dytiscidæ come the two families Amphizoidæ and Pelobiidæ, which contain only two or three species each, but are so isolated that they cannot be attached to any other family.

AMPHIZOIDÆ.

There has been considerable doubt among authors as to the position of this family, which comprises the single genus *Amphizoa*, containing three species from North America, of heteromorous appearance, and about 12 mm. long. These insects in many respects resemble the Parnidæ, being equally poor as swimmers, and being found like them clinging to logs or stones beneath the surface of the water. Leconte, the original describer of *Amphizoa*, considered it a type of a family distinct both from the Carabidæ and the Dytiscidæ; Lacordaire classified it among the Dytiscidæ, while other authors have described it as a heteromeroid form of Carabidæ. Dr. Sharp (Trans. Royal Dubl. Soc. vol. ii. ser. 2, p. 817) discusses the question at length, and while allowing that, strictly speaking, *Amphizoa* is neither a Dytiscid nor a Carabid, yet he comes to the conclusion that it must be classed with the Dytiscidæ; to this conclusion he is in a great measure led by the fact that in *Amphizoa* the meta-thoracic episterna reach the middle coxal cavity, which is therefore enclosed by four pieces instead of three, a peculiarity that until recently has been found in no other beetles except this genus and the Dytiscidæ: Dr. Horn, however, has since discovered that this character also exists in the strange genus *Mormolyce* (Carabidæ, p. 101), and in consequence Dr. Sharp (Trans. Ent. Soc. London, 1882, part i. p. 67) has modified his views and treats it "as an aggregate (not as a family) occupying an intermediate position between the Carabidæ and Dytiscidæ, but a member of neither." Dr. Horn believes that it is far less a Dytiscid than a Carabid. On the whole, *Amphizoa*, to whichever side it may most incline, is a decided link between the old Geodephaga and Hydradephaga, and makes it the more impossible to disconnect them: it may perhaps be noticed in conclusion that another point of transition in *Amphizoa* is found in the more or less distinctly punctate basal joints of the antennæ.

It may seem out of place to discuss this question in a book bearing especially on British Entomology, but it is impossible to avoid all allu-

sion to exotic groups, and the question of the position of *Amphizoa* is especially interesting as bearing upon the position of *Pelobius*, with which in some points it is rather closely allied.

PELOBIIDÆ.

In this family the metasternal episterna do not reach the middle coxal cavity, and in this, as well as in its habits and swimming powers, it differs from the *Amphizoide*: it resembles the members of the latter family, however, in the fact that the metasternum has a very short and small ante-coxal piece in front of the posterior coxæ, separated by a distinct suture, and not produced between the coxæ: in the Carabidæ and the Haliplidæ this ante-coxal piece is large, and is extended triangularly between the posterior coxæ, and the well-marked suture reaches across the body to the episterna; the Dytiscidæ have no trace of an ante-coxal piece, and have the metasternum, which is short, pointed between the coxæ; the Pelobiidæ, therefore, differ from them in this respect, and further in having the extension of the hind coxæ, so characteristic of the Dytiscidæ, short and transverse, instead of broad and extending forwards as in the latter family; the head also is free and not sunk in the prothorax, and the formations of the mentum and mouth parts generally present considerable points of difference; moreover, the general contour and appearance is exceedingly unlike that of the Dytiscidæ, and although this perhaps is not of much weight, yet in a family where the general resemblance is, with one or two exceptions, very striking, it may be allowed a little more consideration than in ordinary cases. In his work on the Dytiscidæ (l. c. p. 258), Dr. Sharp classes the Pelobiidæ with the *Dytisci Fragmentati*, but in his paper on the classification of the Adephaga referred to above (l. c. p. 67) he considers that Dr. Horn is justified in isolating them.

PELOBIUS, Schönherr.

(*Hygrobia*, Latr. *Hydrachna*, Fabr.)

This genus comprises only three species, one of them European, and the others Australian; our species stridulates very loudly, and has earned in some parts of the country the name of "Screech-beetle."

The larva of *P. tardus* is figured by Schiölte, vi., Pl. v. 1 and 3, and vi. 1: it is broadest about middle and convex, of a yellow or luteous colour with darker markings on the head and dorsal scuta; the head is rather broad almost semi-circular, the prothorax very large, trapezoidal, somewhat transverse, the meso- and meta-thorax narrow; the scuta cover the whole upper surface of the segments; the abdominal segments are eight, the last being conical and bearing two long setose cerci; these and the anal appendage are about equal in length, and are each as long as all the abdominal segments together; the legs are long with double claws of about equal length: a figure of the larva viewed sideways is given by Schiölte (vi. 1); in this position it very much resembles a crustacean; the larva is furnished with branchiæ or gills on its under surface; it lives in water and is very predaceous.

P. tardus, Herbst. (*Hermannii*, F.). Oval, very convex, ferrugi-

nous, dull; head finely punctured, free, with a black patch on either side touching eyes, which are large and prominent; thorax very narrow, anterior and posterior margins broadly black, finely rugose at sides, middle of disc finely punctured, anterior margin with a thick fringe of whitish hairs, anterior angles somewhat prominent; elytra with a very large common black spot covering the greater part except margins and base, rugosely punctured, with traces of large striae; anterior tibiae armed with two long parallel spurs; male with anterior and intermediate tibiae dilated, and clothed underneath with thick pubescence; breast black, abdomen ferruginous except the two penultimate segments and part of the last which are black. L. $8\frac{1}{2}$ -10 mm.

Ponds and ditches; local, but common in some districts; it is widely distributed and common in the London district, and has been recorded as plentiful in autumn at times in stagnant waters near Swansea, but it is a southern insect, and the northern records are few and doubtful; it has occurred once at Repton, is doubtful as a Yorkshire species, and the one record from Northumberland, "once near Newcastle, by Mr. Hewitson," is especially commented on by Mr. Bold as probably erroneous, as it has never since been met with: it has not been taken in Scotland.

DYTISCIDÆ.

The following are the chief characteristics of this family:—Antennæ eleven-jointed, glabrous and shining, entirely destitute of setæ or pubescence, inserted very close to the eye, and quite close to the upper portion of the base of the mandible; maxillæ with two lobes, the inner curved at extremity and acuminate, the outer palpiform, divided into two pieces by a transverse suture (in *Amphizoa* it is entire); hind coxæ very large, soldered with, and appearing part of the metasternum, reaching the margin of the elytra when closed; posterior legs modified for swimming by the tibiae and tarsi being furnished with swimming hairs, and being broadened and flattened; posterior tarsi always five-jointed; the anterior and middle ones either four- or five-jointed; according to Dr. Sharp the family contains about twelve hundred species, which we may divide into two series as follows:—

Metathoracic episternum not reaching the middle coxal cavity	DYTISCI FRAGMENTATI.
Metathoracic episternum reaching the middle coxal cavity	DYTISCI COMPLICATI.

DYTISCI FRAGMENTATI.

Metathoracic episterna widely separated from the middle coxæ; hind coxæ extending furthest forward in middle of body (longitudinally)	NOTERINA.
Metathoracic episterna nearly reaching the middle coxæ; hind coxæ extending furthest forward towards sides	LACOPHILINA.

NOTERINA.

Of this tribe we only possess the single genus *Noterus*, which is distinguished by its convex shape, more or less incrassate antennæ, and sub-acuminate apex of elytra.

NOTERUS, Clairville.

This genus comprises six species, which are found in the European region and in Japan; they live in stagnant water: the males are distinguished from the females by having the fifth joint of the antennæ dilated, and also by having the first joint of the anterior tarsi much enlarged.

The larva of *Noterus "crassicornis"* is described and figured by Westwood (Classification, i., p. 102.—p. 100, Fig. 6, 5): it is brown with two ochreous bands across the back, and is about 6 mm. long; the shape is elongate oval, attenuated towards the posterior extremity; the head is produced into a long slender beak, longer than the rest of the head, the jaws meeting together at its tip; the terminal segment is furnished with two moderately long cerci, and is produced between them into a long sharp point; it is evidently highly predaceous.

1. Size smaller; prosternum not keeled in front; male with fifth joint of antennæ much larger than sixth . . . *N. CLAVICORNIS*, De G.
2. Size larger; prosternum keeled in front; male with fifth and sixth joints of antennæ of about equal size . . . *N. SPARSUS*, Marsh.

N. clavicornis, De G. (*crassicornis*, Müll.; *capricornis*, Herbst., teste Bedel and Schaum). Oval, rather convex, somewhat shining, castaneous; head and thorax lighter, as a rule, than elytra; elytra with large coarse punctures arranged in irregular rows towards apex, but ceasing towards base. Male with the antennæ thickened, irregular, fifth and sixth joints largest, the fifth double as long as the sixth, which is transverse; underside of head and thorax spotted with black. Female with the antennæ not irregular, underside unicolorous. Long. 4, lat. $2\frac{1}{8}$ mm.

Local; rare in the London district, Battersea and West Ham (Power); Wicken and Horning Fens; Devonshire; Swansea; common in the Midlands (Repton, &c.); Askham Bog, York; apparently not found further north than Yorkshire; Ireland, Armagh, and near Belfast; not recorded from Scotland; on the Continent it ranges from Norway and Sweden to Portugal, but is not common.

N. sparsus, Marsh (*semipunctatus*, F.; *crassicornis*, Sturm; *capricornis*, Herbst., teste Sharp; *clavicornis*, De G., teste Bedel). Larger than the preceding, but closely resembling it; disc of thorax often darker than sides; elytra with irregular coarse punctures towards apex, which cease towards base; male with the antennæ thickened, irregular, fifth and sixth joints of about equal size, neither being transverse; underside of head and thorax broadly dark. Long. $4\frac{1}{2}$, lat. $2\frac{1}{2}$ mm.

Commoner than the preceding in many places, but rarer in the Midlands; abundant in the London district, and common in the south in places; also occurs in the Swansea district. I have never found it in Derbyshire or Lincolnshire, and can find no record further north, nor is it recorded from Scotland; according to my own experience the preceding species is far more abundant; on the Continent this species is much the commonest.

LACCOPHILINA.

This tribe contains two genera, *Notomicrus* represented by one species from Madagascar, and *Laccophilus* which comprises upwards of a hundred

species widely distributed over the world; they are found both in stagnant and running water.

The larva of *Laccophilus minutus* is figured by Schiödt (vi., Pl. vii., Fig. 6): it is elongate, somewhat ovate, much narrowed behind, convex; the colour is pale with the head and dorsal senta yellowish grey with darker spots; the head is oval and joined to the thorax by a distinct neck; the prothorax is trapezoidal, narrowed in front, and transverse, the meso- and meta-thorax are very short; the eighth segment of the abdomen is much produced, and bears two long ciliated cerci ending in long setæ; the legs are very long, and are terminated by equal claws.

LACCOPHILUS, Leach.*

The species belonging to this genus are easily distinguished from the *Noterina* by their more oval and depressed shape, and also by having the prosternal process acute behind, whereas in *Noterus* it is rounded; the males have the anterior and intermediate tarsi dilated, and, in many cases, both sexes have an organ of stridulation on the surface of the posterior coxæ, consisting of fine parallel striae.

I. Colour testaceous or greenish testaceous; prosternal process short; size larger.

i. Base of thorax not or very obtusely advanced in centre; posterior coxæ provided with a stridulatory organ in both sexes

L. INTERRUPTUS, Panz.

ii. Base of thorax advanced in a sharp angle towards suture of elytra; posterior coxæ without a stridulatory organ

L. OBSCURUS, Panz.

II. Colour pitch-brown; prosternal process long; size smaller; posterior coxæ without a stridulatory organ

L. VARIEGATUS, Germ.

L. interruptus, Panz., (*minutus*, Er., Fab.; *hyalinus*, De Geer, Bedel, &c.). Oval, shining, almost smooth; colour testaceous, head and thorax generally lighter than elytra, which are usually more or less clouded with a darker shade, and are flecked at sides and on disc with variable light markings; when the colour of the elytra is very light, these are less evident; the thorax is scarcely produced in the centre of base, and is very narrow; elytra broadest about middle, with apex rounded; male with the front and middle tarsi only slightly incrassate; both sexes with a stridulating file on posterior coxæ. Long. $4\frac{1}{2}$, lat. $2\frac{5}{8}$ mm.

Ponds, &c.; widely distributed and not uncommon, but local in some districts; Scotland, local, Lowlands, Tweed, Forth, Tay, Solway.

L. obscurus, Panz. (*hyalinus*, Munich Cat. et auct.). Smaller than the preceding, which it much resembles; it is, too, rather more glassy in appearance, with a very slight greenish tinge, and with the lighter spots on elytra less marked, as a rule, but in this it is variable; it may be at once distinguished by its narrower form, more acute angle at the base of the thorax in the middle, the thicker male tarsi, and the absence of a coxal file. Long. 4, lat. $2\frac{1}{2}$ mm.

* More than 100 species of this genus are known, chiefly from the warmer regions of both the Old and New Worlds.

Ponds, &c.; widely distributed; in the London district commoner than the preceding. Scotland, local, Lowlands, Tweed, Forth, Tay, Solway, Clyde.

There is such confusion with regard to the synonymy of the two last species that without examining the specimens from each district it is impossible to be certain of their distribution: one species only is recorded from the Northumberland district, and one from Ireland, but I cannot say which in either case, as the names *minutus* and *hyalinus* have been applied to both species by different authors. Both species extend as far north as Lapland.

L. variegatus, Germ. Smaller and narrower than the preceding; head testaceous; thorax testaceous with anterior and posterior margins dark; elytra pitch-brown, almost black, with margins and a waved fascia at base and another behind middle, interrupted at suture, testaceous; these are rather variable, and in some cases are hardly perceptible; in the male the anterior and middle tarsi are considerably incrassate, and the last ventral segment is much produced in the middle; in this latter point, however, there is not much difference in this species between the male and female; the prosternal process is long and reaches beyond the intermediate coxæ; in neither sex is there a coxal file. Long. 4, lat. $2\frac{1}{4}$ mm.

Local; apparently confined to the south-eastern parts of England; Dover, Pevensey, Deal, Pegwell Bay, Arundel, &c.; it is a rare species on the Continent, and does not extend further north than the south of England.

DYTISCI COMPLICATI.

The great bulk of the species of the family belong to this series: they are distinguished by the fact that the middle coxal cavity, as explained above, is enclosed by four distinct pieces, as the episterna of the meta-thorax take part in the articulation. As Dr. Horn remarks (Classif. Col. North America, p. 64), "they are to be regarded as the highest Dytiscid type, in which not only the maximum size and force is exhibited, but also the most perfect development of the oar-like legs."

The series may be divided into the following tribes, to which, however, Dr. Sharp, whose arrangement is followed, assigns very varying values.

- I. Prosternum deflected between the anterior coxæ so that the prosternal process is placed on quite a different plane from that of the prosternum; front tarsi usually four-jointed (in all our species this is the case) HYDROPORINA.
- II. Prosternum not deflected between the anterior coxæ; front tarsi distinctly five-jointed.
 - i. Hind margins of joints of posterior tarsi not set with flattened and adpressed cilia.
 1. Front tarsi of male with dilated joints oblong; stigmata of last two dorsal segments of abdomen not, or but little broader than the preceding; outline of eye notched by the free margin of the front of head . . . COLYMBETINA.
 2. Front tarsi of male with dilated joints forming a round disc; stigmata of the last two segments of abdomen enlarged; circular outline of eye not interrupted . . DYTISCINA.

- ii. Hind margins of joints of posterior tarsi set with flattened and adpressed cilia externally; front tarsi of male with dilated joints forming a round disc.
 - 1. Suture between episternum of metathorax and wing of metasternum rectilinear; spurs of hind tibiae acuminate at apex HYDATICINA.
 - 2. Episternal suture curvilinear; spurs of hind tibiae emarginate at apex THERMONECTINA.

HYDROPORINA.

This is by far the most extensive of the tribes of the Dytiscidae; it contains about five hundred species, arranged in twenty-six genera; it is specially defined by the structure of the prosternum, which is strongly deflected between the anterior coxae; they are easily known by the third joint of the front and middle tarsi being deeply lobed and concealing the fourth joint, which, however, is usually absent or rudimentary; the true fifth joint (apparently the fourth) is long and slender, and is furnished with claws which are somewhat variable. Members of the tribe are found in all parts of the world, except in some of the Pacific Islands.

Our genera may be divided as follows:—

- I. Posterior coxal cavities widely separated, excised; apical angle of elytra mucronate HYDROVATUS, *Mts.*
- II. Posterior coxal cavities not excised; apical angle of elytra not mucronate.
 - i. First ventral segment soldered to border of posterior coxae, which are not contiguous BIDESSUS, *Sharp.*
 - ii. First ventral segment free.
 - 1. Posterior coxal cavities separated; posterior tarsal claws very unequal HYPHYDRUS, *Ill.*
 - 2. Posterior coxal cavities nearly or quite contiguous; posterior tarsal claws equal.
 - A. Elytral ligula distinct; mesosternal fork not connected with the intercoxal process of metasternum CULAMBUS, *Tions.*
 - B. Elytral ligula wanting.
 - a. Mesosternal fork not connected with the intercoxal process of metasternum DERONECTES, *Sharp.*
 - b. Mesosternal fork connected with the intercoxal process of metasternum HYDROPORUS, *Clav.*

The elytral ligula is a tongue-like process on the inner face of the side margin of the elytra, for the purpose of making the union between the elytra and the ventral segments more perfect.

In those genera mentioned above, *Culambus* and *Deronectes*, in which the mesosternal fork is not connected with the intercoxal process of the mesosternum, the character may be observed by the removal of the thorax, in which case it will be seen that the middle coxae touch one another; in the genus *Hydroporus* proper, in which the connection takes place, they do not touch one another; this is also the case obscurely with the genus *Hyphyporus*, but not with *Bidessus*.

As many of the points of difference given above, although scientifically correct, are rather hard to work with, it is best for students who are

beginning to work the British species to treat the genus *Hydroporus* as a whole, as including (according to the old arrangement) *Bidessus*, *Cælamбус*, *Deronectes*, and *Hydroporus*, and to work them from the specific descriptions; *Hydrovatus* is easily separated by its round shape and the pointed apical angle of elytra, and *Hyphidrus* by its very ovate, thick form, and the unequal claws of the posterior tarsi: the *Hydroporina* as a whole may be known (as far as our fauna is concerned) from the rest of the *Dytisci complicati* by their small size, four-jointed front tarsi, and invisible, or almost invisible, scutellum.

HYDROVATUS, Motschulsky. (*Oxygnathus*, Kies. pars.)

This genus comprises about forty species from various parts of the world; three only occur in Europe, of which we possess one, which has only, as far as I know, occurred at Portsmouth; in certain species the males have several joints of the antennæ irregularly dilated, and in others they are furnished with a stridulatory organ at the junction of the posterior coxæ and metasternum.

H. clypealis, Sharp. Very short, ovate, almost round, dark ferruginous, with the head and thorax lighter, sometimes entirely light ferruginous; head and thorax almost smooth, elytra somewhat coarsely and diffusely punctured with apex pointed; antennæ short, joints 4-10 differing but little from one another, in the male transverse, in the female about as long as broad. In the male the basal joints of the front and middle tarsi are much dilated. The female is alutaceous and dull, the male shining. Long. $2\frac{1}{3}$ - $2\frac{1}{2}$, lat. $1\frac{1}{2}$ mm.

Portsmouth, in a pond on the north side of the Island of Portsea, taken abundantly by Mr. Moncreaff.

This insect was at first referred to *O. caspidatus*, Kunze, by Mr. Crotch, but it is rather smaller, and is distinguished by its antennal characters, the less distinct punctuation of the upper surface, and the much less closely and regularly punctured coxæ.

BIDESSUS, Sharp.

In this genus the prosternal process is larger than broad, parallel-sided, but with a more or less acute extremity; the middle coxæ touch one another; the posterior tibiæ have the basal portion much more slender than the apical one; the number of species is about eighty, which are found in most parts of the world; they are all very small (from 2 to 3 mm. long); three only are found in Great Britain, which may be distinguished from the other members of the old genus *Hydroporus* by having a plainly impressed stria on each side of thorax which is distinctly continued on the base of the elytra.

I. Sutural stria effaced behind middle, or entirely wanting.

- i. Elytra rather convex, black or pitch-brown, at most with a few reddish spots on outer margin B. UNISTRIATUS, Schr.

- ii. Elytra rather flat with well-marked yellow and black bands *B. MINUTISSIMUS*, Germ.
 II. Satural stria prolonged to apex of elytra; elytra dark with a broad waved band towards base *B. GEMINUS*, F.

B. unistriatus, Schr. (*parvulus*, Panz., *bisulcatus*, Steph.). Oval, pitchy, fuscous, or rufescent, thorax rufescent with anterior and posterior margins dark, very finely and thickly punctured, with a strong stria on each side of base which is continued on elytra; elytra thickly punctured; antennæ fuscous, base lighter; legs ferruginous. The male has the front and middle tarsi distinctly dilated; there are two forms of the female, one dull, the other shining like the male; the colour is very variable, sometimes being entirely obscure red with suture darker, sometimes nearly black with margins of elytra and an obscure interrupted fascia at base pale; the thorax, however, appears to be always more or less red. Long. 2, lat. 1 mm.

Very rare. Cambridge (Brewer); Southsea (Moncreaff); Devonshire (Stephens); Norfolk (Crotch); occasionally near London (Hamlet Clark); Suffolk (W. Garneys; one specimen in winter with snow on the ground); it appears usually to occur singly.

B. minutissimus, Germ. (*trifasciatus*, Wollast.). The smallest of the British Dytiscidæ; elongate oval, rather depressed; head reddish with base darker, antennæ with fuscous apex; thorax narrow, testaceous, with a strong stria on each side at base which is continued on elytra to middle; elytra parallel-sided, testaceous, with suture and three transverse bands dark, very finely punctured; legs testaceous. Long. $1\frac{2}{3}$, lat. 1 mm.

Originally reputed as British on the authority of specimens said to be taken by Mr. Clear in rivers near Cork, and described by Mr. Wollaston; these, however, appeared afterwards to have had a continental origin; Mr. and Mrs. Wollaston subsequently discovered the species among the small submerged shingle at the edge of Slepton Ley, about seven miles to the westward of Dartmouth, Devonshire, in shallow clear water, about the year 1868: it has been taken in the same locality within the last three or four years by Mr. Bridgman, of Burton-on-Trent, but has not, I believe, occurred elsewhere in Great Britain.

B. geminus, F. Oval, not very shining, rather flat, finely pubescent; head brownish, antennæ testaceous, apex fuscous; thorax reddish on disc with anterior and posterior margins darker, with a stria on each side of base, which is only continued on elytra for about the same distance as on thorax; elytra very finely punctured, dark, with apex and a broad irregular band near base yellow; legs testaceous, posterior tibiae fuscous at apex. Long. $2\frac{1}{2}$, lat. $1\frac{1}{4}$ mm.

Ponds and ditches; not uncommon in the London district, Woking, Wimbledon, Lee, Epswood, &c.; common in shallow muddy water in the fen districts (Wicken and Burwell Fens, &c.); rather rarer to the north; said to have occurred in Yorkshire; Northumberland district, Gosforth very rare; not recorded from Scotland; Ireland, near Belfast.

HYPHYDRUS, Illiger.

This genus comprises at present about twenty-five species, all from

the Old World (Africa, especially Madagascar, Japan, Australia, &c.) ; but probably this number will be largely increased ; two only are European, one of which is very common in the centre and south of England ; the second species, *H. variegatus*, has been reputed as indigenous, but the single specimen on which it rested (supposed to have been taken in Lancashire or Cheshire) was far too doubtful to secure its admittance into our lists, especially as the species appears to be almost entirely confined to Northern Africa and Southern Europe.

The larva of *H. ovatus* is figured by Schiödte (ii., Pl. v., Fig. 1) : it corresponds so closely with Westwood's description of the larva of *Noterus* referred to above (p. 160), that it is possible that some mistake may have arisen ; the very peculiar shape of the head is exactly repeated ; the larva (excluding the head) has the shape of a rather elongate peg-top ; the eighth segment is produced into a long point, and bears two moderately long setose cerci, which start from its base ; it is of a luteous colour with somewhat varied dark markings : as a rule the dorsal segments are dark fuscous with the prothorax (except front), and the two first and two last segments of abdomen light.

***H. ovatus*, L. (*ferrugineus*, L., ♀).** Broad oval, very convex on both the upper and under sides, ferruginous, with the elytra darker, reddish at base and sides ; male with the upper side shining, thickly, strongly, and irregularly punctured, with anterior and intermediate pairs of legs thickened and the tarsi dilated ; female dull, obsoletely punctate. Long. $4\frac{1}{3}$, lat. 3 mm.

Ponds and ditches ; very common throughout the central and southern counties of England and Wales ; less common further north, although widely distributed ; Scotland, very local, only recorded from the Solway district ; Ireland, Portmarnock, Armagh, &c., and probably common.

The *variegatus*? of Steph. Mand. ii. 45 is a variety of this insect, and has nothing to do with *H. variegatus*, Aubé.

CÆLAMBUS, Thomson. (*Hygrotus*, Steph. pars.)

This genus comprises about forty species, which are chiefly found in Europe, Asia, and North America ; they differ very widely in form and general appearance, one division of our species being of very short and convex form, and the other being much longer, wider, and more depressed and apparently quite different : it is probable that one of the species, *H. decoratus*, will have to be separated off as a distinct genus, for it possesses, although obscurely, the chief character of *Hydroporus*, viz. the connection of the intercoxal process of the metasternum with the mesosternal fork ; for the present, however, it is best to leave it with the seemingly allied species ; the chief generic character appears to be the free and abrupt ligula on the inner face of the elytra.

The larva and pupa of *C. parallelogrammus* are figured by Schiödte (ii., Pl. iv., Fig. 13, 14) : it is of a very peculiar torpedo-like form, being broad and convex with the head very large and triangular and produced into a broad horn ; the thorax is about as broad as the base of the head, subquadrate, somewhat transverse with the angles rounded ; the meso- and meta-thorax and the first five abdominal segments are of about equal length, all being very narrow, the second abdominal segment being the

broadest part of the body; the sixth abdominal segment is much longer than the fifth, and with the seventh and eighth becomes much narrower behind, the last tapering off into an abrupt blunt point; the cerci are long, and bear long setæ at base and apex; the legs are slender and rather long, and end in equal claws; the colour is pale with the head and scuta luteous, with a few small dark spots on head and segments: the pupa is short and broad, and is chiefly remarkable for being covered with thick and strong setæ.

The description of this larva will serve for that of a *Doronectes* or a typical *Hylroporus*; the larvæ of *D. depressus*, *H. halensis*, and *H. palustris* differ very slightly from it, the differences being chiefly found in colour, pubescence, length of cerci, and one or two other points.

- I. Labrum much concealed, head rounded in front, front with a more or less distinct raised margin; form very short and convex.
 - i. Head with two strong broad impressions, leaving a ridge in centre; length 3 mm.
 1. Punctuation of elytra double, consisting of large and small punctures.
 - A. Larger punctures more scattered C. VERSICOLOR, Schall. (*reticulatus*, F.).
 - B. Larger punctures closer together C. QUINQUELINEATUS, Zett.
 2. Punctuation of elytra uniform, deep and strong. C. INÆQUALIS, F.
 - ii. Head with at most a narrow impression near eye; length 2 mm. C. DECORATUS, Gyll.
- II. Labrum little concealed or quite conspicuous; head emarginate in middle of front, front not margined.
 - i. Short oval; elytra with apical angle plainly produced into a short sharp point C. CONFLUENS, F.
 - ii. Long oval; elytra with apical angle not produced.
 1. Thorax with a dark spot on disc.
 - A. Punctuation very fine; thorax uniformly punctured; none of the dark markings reaching base of elytra C. NOVENLINEATUS, Steph.
 - B. Punctuation coarser; thorax impunctate on centre of disc; some of the dark markings always reaching base of elytra. C. PARALLELOGRAMMUS, Ahl.
 2. Thorax without dark spot on disc; punctuation very coarse C. IMPRESSOPUNCTATUS, Schall. (*picipes*, F.).

In some of the members of this genus the females are very markedly dimorphic, i.e. present two different forms, in the one case being shiny like the male, in the other dull and opaque; this is to a greater or less extent a characteristic of the whole of the *Dytiscæ complicati*, and will be again referred to under the genus *Dytiscus*, in which the females attain the greatest amount of sexual difference from the males.

C. versicolor, Schall. (*reticulatus*, F.). Short oval, convex, rather shiny, smooth: head and thorax thickly and finely punctured, ferruginous; elytra at base broader than base of thorax, very thickly and

finely punctured with scattered large punctures, reddish testaceous with irregular and much interrupted longitudinal black bands, which are very variable in extent; there appear to be no external sexual distinctions. L. $3\frac{1}{2}$, lat. 2 mm.

Ponds and ditches; local but not uncommon in the centre and southern parts of England from Yorkshire downwards; becomes rarer further north (Mr. Bold knew of only two or three local specimens from the Northumberland district), and is not recorded from Scotland. Ireland, near Belfast and Dublin.

C. quinquelineatus, Zett. Very closely resembles the preceding in size, shape and general appearance, but may at once be distinguished by the larger punctures on the elytra being much more numerous and closer to one another, and also by having the longitudinal dark markings on the elytra narrower, and more regular, as a rule, but in this point it somewhat varies; the prosternal process is depressed in front instead of being elevated as in the preceding species. Long. 3, lat. 2 mm.

Rare; the original specimens taken in this country by Mr. Waterhouse were believed to have occurred near London, and Dr. Power has a specimen marked "Battersea Fields;" Repton rare (Mr. Garneys); Northumberland district, "Prestwich Carr and Gosforth Lake, September;" Scotland, very rare, Lowlands, Tweed and Solway; Ireland, Killarney, and near Armagh.

C. inæqualis, F. Short, convex, rather broad, without pubescence; head and thorax ferruginous, anterior and posterior margins of the latter dark; elytra black with the margins and some irregular markings testaceous or reddish testaceous; elytra thickly and strongly punctured, without smaller punctures interspersed; the colour is variable, but the sutural portion is always black and the margins light, and, as a rule, the dark portion is not spotted. Long. 3, lat. 2 mm.

Ponds and ditches inland and near the coast; common and widely distributed throughout the kingdom as far north as the Moray district of Scotland, and probably occurs in the extreme north, as it is abundant in Northern Europe.

C. decoratus, Gyll. Short, oval, convex, without pubescence, shining, smaller and with apex of elytra more acuminate than in the preceding species; head red, thorax brownish red, thickly punctured in front and behind, disc much smoother; elytra dark, with side margins and two irregular spots on each towards base and apex (both reaching side margins), orange-testaceous; elytra moderately strongly and not very closely punctured with smaller punctures interspersed. Long. $2\frac{1}{3}$, lat. $1\frac{1}{2}$ mm.

A very local species both in England and on the Continent; ponds and ditches; London district, Lee Pit, Notting Hill (formerly), Woking, Cowley; very abundant at Askham Bog near York; Hamlet Clark (Zoologist, clvi. 4857) gives Norfolk and Northamptonshire as localities.

C. confluens, F. Oval, somewhat elliptic, rather depressed on disc, but convex on the under side, not pubescent; head testaceous, behind and near the eyes dark brown; thorax testaceous; elytra pale testaceous with the suture and three or four abbreviated lines reaching from near

apex to about middle, black, very finely punctured with larger punctures sparingly distributed, and sometimes arranged more or less in rows; underside black: the difference between the sexes is very slight. Long. $3\frac{3}{4}$, lat. 2 mm.

Ponds, &c.; local, but widely distributed throughout England, both inland and in brackish ponds near the coast; Scotland, rare, Lowlands, Forth, Solway, Clyde, Ireland, near Belfast and Armagh.

C. novemlineatus, Steph. Oval, rather elongate, without pubescence, testaceous, with a well-defined spot in centre of thorax (very rarely continued on each side horizontally), and the suture and four lines on each elytron black, underside of abdomen and breast black; thorax with a minute fovea in the centre; elytra very thickly and finely punctured; male shining, with the two anterior pairs of tarsi strongly dilated; female dimorphic, one form being like the male, the other very dull (the latter is the *nigrolineatus*, Zett., *parallelus*, Aubé). Long. 4, lat. 2 mm.

A northern species; locally abundant in the Scotch lakes as far north as the Moray district; Loch Leven and Loch Gelly, abundant (Dr. Power); Northumberland, Prestwich Carr (Bold) and Rothley Lakes (abundant, Power). It occurs in lakes in Lapland. Stephens (Ill. Mand. ii. 192) says that two specimens were taken by Mr. Rudd at Weyhill (near Andover).

C. parallelogrammus, Abr. Oblong-ovate, without pubescence, testaceous, with two spots on head, a spot in the middle of thorax, and the suture and several irregular lines on elytra parallel to it, black; thorax strongly punctured on anterior and posterior margins, disc almost smooth, with a small fovea in the centre; elytra thickly punctured; underside of head and thorax reddish yellow, breast and abdomen black; male shining, with elytra rather strongly punctured, with the two anterior pairs of tarsi dilated; female dimorphic, one form shiny and punctured like male, the other very dull and opaque, very finely and obsoletely punctured (the latter is the *nigrolineatus*, Kunze). Long. $4\frac{1}{2}$, lat. $2\frac{1}{2}$ mm.

Ponds and ditches, both fresh and brackish, but more commonly in the latter not far from the sea. Widely distributed, although somewhat local, as far north as Hartlepool and the Northumberland district; not recorded from Scotland or Ireland: it probably occurs in the latter country, but is not so likely to be found in Scotland, as it is wanting throughout Northern Europe.

C. impressopunctatus, Schall. (*picipes*, F.). Oblong oval, somewhat convex, not pubescent, ferruginous testaceous, with the vertex of head on each side (and sometimes a spot near mouth), anterior and posterior margins of thorax (the former very narrowly), and several indistinct lines on elytra, parallel to suture, black; thorax strongly punctured, except on disc, where there is a small fovea; male with elytra very strongly and coarsely punctured at base, more finely towards apex, with the sutural stria and two others strongly marked by rows of punctures set thickly together; anterior and intermediate tarsi dilated; female

dimorphic, one form shining and punctured as in male, the other very dull and opaque, with the elytra uniformly and finely punctured, with the three rows of punctures obsolete; this form is rather rare, and is the *lineellus*, Gyll. Long. 5, lat. $2\frac{2}{3}$ mm.

Ponds, &c.; local; rather common in the London district, Lee, Lewisham, Penge, Peckham, Wimbledon, &c.; Norfolk; Shropshire; Devonshire; Swansea; Askham, near York; Scotland, rare, Lowlands, Solway district; Ireland, near Waterford (Power) and Killarney (Wollaston). This species stretches right across Siberia into North America.

DERONECTES, Sharp.

This genus comprises about forty-five species, which mostly inhabit Europe and the Mediterranean regions, a few being found in North America; we possess five species as British, which are among the most conspicuous of our indigenous Hydropori.

- I. Upper surface very finely punctured, with thickly scattered larger punctures, unicolorous dark brownish-red (head and base of elytra lighter) . . . **D. LATUS, Steph.**
- II. Upper surface uniformly and very finely punctured.
 - i. External border of elytra furnished near apex with a small sharp tooth.
 1. Upper surface covered with close golden pubescence; dark markings mostly in lines; thorax broader at base than at apex **D. ASSIMILIS, Payk.**
 2. Upper surface almost smooth; dark markings mostly in patches; thorax almost as broad at apex as at base **D. DEPRESSUS, F.**
 - ii. External border of elytra without tooth near apex.
 1. Sides of thorax and elytra strongly rounded, forming a distinct angle at junction; disc of thorax not marked with black **D. 12-PUSTULATUS, Ol.**
 2. Sides of thorax and elytra together forming a continuous outline; disc of thorax with black markings **D. GRISEO-STRIATUS, De G.**

D. latus, Steph. Broad, oval, convex, but rather depressed on disc, dull, very slightly pubescent, ferruginous or fusco-ferruginous, elytra darker with lighter base, antennæ and legs reddish testaceous; entire upper surface very finely punctured with numerous large and deep punctures irregularly distributed over its whole extent, but more plain on elytra; elytra with traces of raised lines; front and middle tarsi broad in both sexes, but more dilated in male; in the female there is a short raised longitudinal fold near the outer edge of the elytra at some distance from apex. Long. $4\frac{1}{2}$, lat. $2\frac{5}{8}$ mm.

Rare; in clear or running water among shingle and stones, &c. Stephens' original specimens were from Marton Lodge, Yorkshire; Hollington, near Hastings (Butler); Tilgate Forest (Power); Northumberland district (Onseburn, Devil's Water, Moors near Lanercost); Scotland, rare, in rapid waters, Lowlands, Tweed, Forth, Solway and Moray districts (Polmont (near Glasgow) in some numbers (Power)); banks of Almond, near Broxbourne (Sharp).

D. assimilis, Payk. Oblong oval, rather convex, covered with very thick and short yellowish pubescence, rather dull; head testaceous with the extreme hinder margin black; thorax testaceous with anterior margin narrowly and posterior margin with two patches on each side of middle black, basal margin plainly broader than anterior margin; elytra testaceous, with six dark lines on each which do not reach apex and, as a rule, cease before base, the sixth abbreviated and broken up into patches; elytra with a sharp tooth on margin near apex; upper surface very closely and thickly punctured; underside ferruginous or fuscous; front and middle tarsi broad in both sexes, but more especially so in the male. Long. $4\frac{1}{2}$, lat. $2\frac{1}{3}$ mm.

Ponds and ditches inland and near the sea; somewhat local, but widely distributed throughout England from Northumberland to Devonshire, but rare apparently in the south, and near London; the only record in the London district appears to be Reigate Heath (Brewer); I have found it commonly at Mablethorpe, Lincolnshire, in a ditch not far from the coast. Scotland, local, Tweed, Forth, Tay, Moray.

A variety of this insect is described by Mr. Rye in Ent. Mo. Mag. xii. 175, taken by Mr. Horace Francis, of Lee, at Keswick, Cumberland; this is smaller with only the tip of the apical joint of the antennæ dark, and with the thoracic dark spots absent in the male, and only indicated in the female; the colour, however, of the species is occasionally variable, although more constant than in many others.

D. depressus, F. Oblong oval, with very short and thick pubescence, somewhat dull; head, except extreme hind margin, testaceous; thorax testaceous with anterior margin very narrowly dark, and posterior margin with two black patches as in the preceding species; elytra testaceous with dark lines which are most usually entirely or almost entirely confluent, and form a sort of broad lattice-work pattern; the colour, however, is very variable; sometimes the whole of the disc of the elytra is dark, having only the margins light; the small distinct tooth on margin near the apex is a character that will at once distinguish it from the succeeding species, which it much resembles; punctuation of upper surface very fine; underside reddish or reddish testaceous; the male has the anterior and intermediate tarsi broader than the female, and the thorax almost wider than base of elytra, whereas in the female it is distinctly narrower. Long. $4\frac{1}{2}$, lat. $2\frac{5}{8}$ mm.

Running water; widely distributed throughout England and Wales; Scotland, common, as far north as the Moray district; Ireland, Armagh, Dublin, &c., and probably common.

D. duodecim-pustulatus, Fab. Very closely resembles the preceding in general appearance and markings, but with the anterior margin of thorax more broadly dark, and elytral dark markings still more confluent; it is also a much larger insect, and the sides of thorax and elytra are more strongly rounded; it is easily distinguished also by the absence of the small tooth near apex of elytra; underside reddish testaceous, sometimes infusate; male with the anterior and inter-

mediate tarsi dilated, and the intermediate tibiæ curved. Long. $5\frac{1}{2}$, lat. $2\frac{3}{4}$ mm.

Running water; not uncommon and widely distributed throughout England and Wales, although somewhat local in certain districts; Scotland, common as far north as the Moray district; Ireland, Waterford, Armagh, &c.

D. griseo-striatus, De G. Oval, rather narrow, somewhat dull, plainly but closely pubescent; head testaceous with two dark patches near eyes reaching hind margins; thorax testaceous with dark markings usually separated by a fine testaceous longitudinal line in centre, centre of disc with a minute fovea; elytra long, forming with thorax an uninterrupted outline, testaceous, with about seven lines on each black, which are usually distinct, although in places confluent; the pubescence gives the whole insect a greyish appearance; the upper surface is very closely and finely reticulate; underside black. The sexes are hardly distinguishable externally. Long. $4\frac{1}{2}$, lat. $2\frac{1}{4}$ mm.

Lakes in the Highlands of Scotland. Local, Forth, Dee, Argyle, and Moray districts; also in Shetland; said to have occurred in the north of England.

This species comes near *H. halensis*, and used to do duty for it in collections, until Dr. Schaum pointed out its differences: it may at once be separated from that species by its longer form, more continuous outline, finer margins of thorax, and usually darker colour.

HYDROPORUS, Clairville.

The genus *Hydroporus* proper contains about 150 species, which are found almost exclusively in Europe and the circum-Mediterranean region, Northern Asia, and North America; only three or four species come from the southern hemisphere, one of which is from Chili, a fact worth noticing in connection with what has been said before (*ante*, p. 140): the species are all small, and, as a rule, inconspicuous, and are in many instances very hard to determine; in fact "the black *Hydropori*" are always one of the greatest difficulties of collectors. Dr. Sharp divides the whole genus into two divisions, and nine groups; but, besides the fact that the difference between the divisions is grounded on a very obscure character (although a constant and good one), the practical usefulness of the arrangement to British Coleopterists is very small, as one of the nine groups contains twenty-two of our thirty-six or thirty-seven species, and another contains nine, so that only five or six are left in the others.

I have spent a very long time in the endeavour to make even an artificial arrangement that might be serviceable, but none appears to be satisfactory, and I had intended to leave out a table altogether; the one given below will, however, be found of use to any students who will make themselves acquainted with the general differences and appearance of the various sections beforehand: I am indebted for it in great measure to M. Bedel: its chief fault is that the character on which one of its chief divisions depends is not always very obvious, viz. the angle made by the lateral border of the elytra and thorax viewed sideways, although

it is acknowledged by all students of the Dytiscidæ to be in many cases a very valuable character; it is, however, in most cases very evident, as will be plain to any one who will compare together *H. dorsalis* or *lineatus* with *H. planus* or *nigrita*, and the species concerning which any difficulty might arise as to which section they belonged (as *H. memnonius*, *obsolitus*, and *ferrugineus*) are, as a rule, easily distinguished by other characters, and are mostly rare and seldom met with.

The colour of the species is in many cases a great help towards distinguishing them, but it is not possible to classify them by this, as it is in the case of Bembidium, as the colour varies very considerably, and some of the species that as a rule show markings at base of elytra or on their disc occasionally have them wanting: the succeeding table, however, may be of some service, as long as it is remembered that it is merely provisional and applies to mature specimens only.

1. Elytra black with yellow lines or markings distributed over disc: *H. pictus*, *granularis*, *flavipes* (very small species), *H. lepidus*, *palustris*, *incognitus* (medium-sized species), *H. dorsalis* (larger species, markings sometimes visible at base only, sometimes almost absent).

2. Elytra testaceous with black markings: *H. halensis*, *Darvii*, *septentrionalis*, *rivalis*.

3. Elytra black with lighter markings apparent at base only, or close to margins: *H. erythrocephalus*, *planus*, *rufifrons*, *pubescens*, *vittula* (lighter markings usually more or less obsolete, sometimes hardly traceable), *H. marginatus*, *litturatus* (lighter markings always plain).

4. Elytra ferruginous or olive brown suffused with a lighter colour, especially at base (species long oblong, all very rare): *H. oblongus*, *ferrugineus*, *obsolitus*.

5. Upper surface unicolorous black or pitchy brown (head sometimes lighter and thorax darker): *H. discretus*, *nigrita*, *memnonius*, *melanarius* and *v. monticola*, *longicornis*, *longulus* (*celatus*), *morio* (*atriceps*), *Gyllenhalii*, *umbrosus*, *neglectus*, *tristis* (the latter three are occasionally a little lighter at base and shoulders).

6. Upper side reddish, head and, as a rule, thorax lighter than elytra: *H. angustatus*, *obscurus*, *Scalesianus* (unicolorous), *H. lineatus* (with dark lines on elytra).

I. Thorax with a small longitudinal impression on each side at base.

i. Antennæ with fourth joint plainly smaller than the joints above and below it; species very small, black with yellow markings on disc of elytra.

1. Body oval, convex; head red *H. PICTUS*, F.

2. Body oblong, rather depressed; head black.

A. Elytra with side border and two longitudinal lines (one dorsal) yellow *H. GRANULARIS*, L.

B. Elytra with side border and four lines (often abbreviated and interrupted) yellow *H. FLAVIPES*, Olf.

ii. Antennæ with fourth joint equal to the joints above and below it; species larger ($2\frac{3}{4}$ -1 mm.).

1. Head black; elytra black with yellow markings *H. LEPIDUS*, Olf.

2. Head entirely or almost entirely testaceous; elytra testaceous with black markings.

A. Form short oval; thorax with a more or less distinct dark band on disc; elytra almost impunctate *H. RIVALIS*, Gyll.

B. Form long oval; elytra with distinct scattered punctures.

- a. Head without oblique stripes, dark at base and near eyes; thorax with two dark transverse patches on disc, separated (as a rule) in centre II. SEPTENTRIONALIS, *Gyll.*
- b. Head with an oblique stripe on each side forming a V; thorax with two strong black transverse impressions at base . . . H. DAVISII, *Curt.*
- II. Thorax without longitudinal impressions.
- i. Thorax testaceous with two black spots divided by a central line H. HALENSIS, *F.*
- ii. Thorax dark with at most sides lighter.
1. Lateral border of thorax viewed sideways forming a plain, though obtuse, angle with the borders of the elytra.
- A. Base of thorax widely impressed at sides . . H. DORSALIS, *F.*
- B. Base of thorax not impressed towards sides.
- a. Underside red, elytra with more or less distinct black lines H. LINEATUS, *F.*
- b. Underside black or brown, elytra without trace of black lines.
- a*. Size very small (L. 2-2½ mm.).
- a†. Thorax yellowish red, elytra reddish brown H. SCALESIANUS, *Steph.*
- b†. Thorax black, elytra black or brown.
- a‡. Thorax with base narrower than base of elytra; sides narrowly margined H. NEGLECTUS, *Schaum.*
- b‡. Thorax with base as broad as base of elytra; sides not margined . . H. UMBROSUS, *Gyll.*
- b*. Size larger (L. 2½-4 mm.).
- a†. Sides of thorax not, or very indistinctly margined.
- a‡. Thorax impunctate on disc, elytra without spots H. ANGUSTATUS, *Sturm.*
- b‡. Thorax entirely punctured; elytra with more or less distinct lighter markings.
- *. Head more or less red; thorax with margins broadly yellow or red yellow.
- †. Form oval; punctuation very fine; length 4½ mm. H. MARGINATUS, *Duff.*
- ††. Form oblong; punctuation coarser; length 3-3½ mm.
- ‡. Form narrower; pubescence thicker H. PALUSTRIS, *L.*
- ‡‡. Form broader; pubescence more scanty . . . H. INCOGNITUS, *Sharp.*
- ***. Head dark, elytral markings very indistinct, sometimes almost obsolete; thorax unicolorous H. VITTULA, *Er.*
- b†. Sides of thorax distinctly (although sometimes finely) margined.
- a‡. Larger species, oblong and parallel-sided (L. 4 mm.).
- *. Elytra and thorax ferruginous with suffused lighter markings . . . H. FERRUGINEUS, *Steph.*

- **. Elytra entirely dark ;
 thorax dark with red-
 dish margins II. MEMNONIUS, Nic.
 b†. Smaller species (L. $2\frac{3}{4}$ -
 $3\frac{1}{2}$ mm.).
 *. Punctuation very strong
 and deep II. GYLLENHALII, Schiedte.
 **. Punctuation rather fine
 and shallow.
 †. Upper side unicolor-
 ous black II. MORIO, Dej. (*atriceps*, Crotch).
 ††. Head broadly red-
 dish; elytra brownish II. TRISTIS, Payk.
 2. Lateral border of thorax viewed sideways
 continuous with the border of elytra or
 forming a scarcely perceptible angle
 with it.
 A. Upper surface smooth, without, or with
 very slight, pubescence.
 a. Thorax with margins broadly testa-
 ceous; elytra entirely suffused with a
 lighter shade, rounded at apex II. OBSOLETUS, Abe.
 b. Thorax with margins narrowly and
 obscurely red; elytra with base only
 suffused with a lighter shade, some-
 what acuminate at apex II. OBLONGUS, Steph.
 c. Upper side unicolorous, apex of elytra
 rounded.
 a*. Antennae entirely red.
 a†. Hind coxal cavities quite ap-
 proximate; form longer and
 more oblong; thorax almost
 impunctate on disc.
 a‡. Elytra more finely punc-
 tured; antennae more
 elongate II. LONGICORNIS, Sharp.
 b‡. Elytra more coarsely punc-
 tured; antennae less elon-
 gate II. MELANARIUS, Sturm, and
 v. *monticola*, Sharp.
 b†. Hind coxal cavities minutely
 separate; form shorter and
 more oval; thorax almost
 always plainly punctured on
 disc II. LONGULUS, Muls. (*celatus*, Clark).
 b*. Antennae, except base, black II. NIGRITA, F.
 B. Upper surface more or less plainly
 pubescent.
 a. Lateral border of thorax not visible
 from above; head red.
 a*. Length $2\frac{3}{4}$ mm.; punctuation
 rather diffuse II. OBSCURUS, Sturm.
 b*. Length 1 mm.; punctuation fine II. FRYFEROCEPHALUS, L.
 b. Lateral border of thorax plainly
 visible from above.
 a*. Length $4\frac{1}{2}$ 5 mm.; antennae
 with joints 5 8 elongate or
 oblong.

- a†. Punctuation rather strong; antennæ long; pubescence long but scanty; front of forehead red *H. RUFIFRONS*, *Duft.*
- b†. Punctuation close; antennæ short; pubescence very thick; head black *H. PLANUS*, *F.*
- b*. Length 3-3½ mm.; antennæ with joints 5-8 oval, rounded.
- a†. Elytra entirely black; pubescence more scanty *H. DISCRETUS*, *Fairm.*
- b†. Elytra brownish with obscure lighter markings at extreme base and shoulders; pubescence thicker *H. PUBESCENS*, *Gyll.*
- c†. Elytra brown with plain yellow markings at base and indistinct markings at apex; pubescence long, but not thick . . . *H. LITURATUS*, *F.*

H. pictus, *F.* Oval, broadest in middle, elytra somewhat pointed at apex, rather convex, sparingly pubescent, rather closely but distinctly punctured; head and sides of thorax red, disc of latter dark brown or reddish; elytra dark with two large and very irregular waved or dentate testaceous bands on each, one at base, and the other towards apex, the extremities of which, as a rule, meet or almost meet on disc, and enclose a large dark patch on each side; the colour, however, is sometimes variable, and sometimes the four testaceous patches are small and show no signs of meeting; the suture and a broad space on either side is always dark; the striae on each side of base of thorax are very small; in the male the anterior tarsi are plainly dilated. Long. $2\frac{1}{3}$, lat. $1\frac{1}{2}$ mm.

Ponds, &c.; common and widely distributed throughout the country; local in Scotland, Tweed, Forth, Moray, Clyde; Ireland, Belfast, Dublin, Armagh, &c.

H. granularis, *L.* Oval, somewhat elliptic, rather depressed on disc, somewhat dull, slightly pubescent, finely but distinctly punctured; head and thorax brownish black, the latter with margins reddish; elytra black with two testaceous longitudinal lines on each, one near margin, and one on disc, the latter dilated at base; male with the anterior and intermediate tarsi slightly dilated. Long. $2\frac{1}{3}$, lat. $1\frac{1}{2}$ mm.

Ponds, &c.; a local species, although sometimes abundant where it occurs; Lee, Horsell, and Woking in the London district; Askham Bog (very common); Cambridge, Wicken and Quy Fens, &c.; Swansea; Northumberland district; not recorded from Scotland or Ireland.

H. flavipes, *Ol.* Oblong oval, rather convex, with fine punctuation and pubescence; head black; thorax black with margins plainly testaceous, basal striae very minute; elytra black with side border and several longitudinal lines on each, more or less abbreviated, testaceous; these are, however, variable; male with the posterior tarsi slightly dilated. Long. $2\frac{2}{3}$, lat. $1\frac{1}{2}$ mm.

Ponds, &c., especially in heathy districts; rather local, but not uncommon where

it occurs: it appears to be chiefly found in the London district (Weybridge, Esher, Reigate, Chobham, Gravesend, &c.), and the New Forest; Devonshire; Anglesea (Wollaston); Ireland, near Belfast and elsewhere.

H. lepidus, Ol. Oval, convex, pubescent, elytra very strongly acuminate behind; head and thorax black; elytra black with the margins and two or three wavyed bands and markings on each testaceous, those towards base being usually most conspicuous; the basal striae of thorax are indistinct; in British specimens the colour is fairly constant, and the punctuation distinct, although fine, but in Southern Europe it is much more variable, and specimens occur which are yellow with the suture, a large transverse patch on middle, and a humeral dot black; smooth forms also occur in which the punctuation is obsolete, but these too are not found further north; the sexes are scarcely distinguishable. Long. 3, lat. $1\frac{7}{8}$ mm.

Ponds, either stagnant or with water running through them; somewhat local but widely distributed throughout England and Wales; Scotland, local, Lowlands, Tweed, Forth, Dee, Clyde; Ireland, Belfast, Dublin, &c.: I have taken the species in profusion in a pond close to the coast at Bournemouth through which a strong stream was running, and also in a quite stagnant pool in the middle of Langworth Wood, Lincoln.

H. rivalis, Gyll. (*fluvialis*, Steph.). Broad oval, rather round, without pubescence, rather dull, almost impunctate; under side blackish, sometimes ferruginous, upper side testaceous, disc of thorax more or less dark, elytra with longitudinal black lines more or less abbreviated and confluent; striae at base of thorax very plain; front and middle tarsi of male rather broader than in female; antennae, except extreme apex, testaceous. Long. 3, lat. 2 mm.

Running water; local but widely distributed; rare in the London district, Gomshall, Merton (Surrey); Selborne; R. Tavy, Devonshire; Yorkshire; Northumberland and Durham district; Scotland, common in streams, Lowlands, Forth, Tay, Moray. Ireland, Belfast, Longhilstown, Waterford, &c.

The var. *summarkii* differs slightly in form, colour, and sculpture from the type, but is hardly a variety, much less a species, as some authors have considered it to be.

H. septentrionalis, Gyll. This species rather closely resembles the preceding, from which it may be at once distinguished by its longer and more oblong form, and longer elytra, the dark lines on which are as a rule much more distinct and less confluent; the basal striae of thorax are usually abbreviated both in front and behind, and the surface of the elytra is plainly and diffusely punctured; the dark markings on thorax, also, are more distinct, and are separated in the centre by a longitudinal testaceous band; under side black, sometimes ferruginous; the sexes scarcely differ. Long. $3\frac{1}{8}$, lat. 2 mm.

Running water; it is, as its name implies, a northern species, but has been taken in Bewdley Forest, Worcestershire, by Mr. Blatch, and has occurred at Studley and Scarborough, Yorkshire; Dr. Leach's record from Devonshire requires confirmation; Northumberland and Durham district; Scotland, common in streams both Lowlands

and Highlands, throughout the greater part of the country. Ireland, Killarney, and river Dodder.

H. Davisii, Curt. Oblong oval, without pubescence, somewhat dull, under side black, upper side testaceous, head with an oblique dark stripe on each side meeting at vertex, thorax with more or less distinct dark transverse markings on disc, separated by a testaceous longitudinal band in centre; elytra with seven or eight dark lines on each, confluent in places, especially at margins; apex of elytra acuminate, their surface very finely reticulate with scattered larger punctures; front and middle tarsi considerably dilated in male, claws of front ones more elongate in male than female. Long. $4\frac{1}{3}$, lat. $2\frac{1}{4}$ mm.

Always found in very clear waters; Northumberland and Durham district; Scotland, common in streams, Lowlands and Highlands, Forth, Dee, Moray, (Polmont near Glasgow in abundance (Power)).

H. halensis, F. Oval, rather broad, dull, with very thick and short pubescence; head testaceous; thorax testaceous with two dark spots divided by a central line, which touch or almost touch the basal margin; elytra testaceous, with six lines and interspersed spots black; metasternum black; upper surface hardly visibly punctured, underside strongly punctured; male with the anterior and intermediate tarsi broader than in female, claws of anterior tarsi longer; abdomen black, middle of apex ferruginous; female with the abdomen ferruginous. Long. $4\frac{1}{3}$, lat. $2\frac{1}{2}$ mm.

A fen species: first taken at Haughley, Suffolk; Ranworth, Wicken, and Horning Fens; Bungay; Stowmarket.

H. dorsalis, F. Oblong oval, somewhat depressed, plainly pubescent, colour variable, usually black, with head, margins of thorax, and markings towards base and sides of elytra, and sometimes at apex, rufescent; thorax transverse, with a large depression on each side of base, the depressions meeting more or less distinctly in centre, base narrower than base of elytra; antennæ rather long and slender, fuscous with base red; underside reddish; male, rather shiny, with anterior and intermediate tarsi strongly dilated, plainly punctured; female duller, more obsoletely punctured. Long. $4\frac{5}{8}$, lat. $2\frac{1}{2}$ mm.

Ponds, &c.; not uncommon and widely distributed, but rather local; it occurs in the Northumberland district, but is very doubtful as Scotch (there being only one record, "Rae hills, Rev. W. Little," Murray's Cat.); it has not yet been recorded from Ireland, as far as I can discover.

In some specimens the markings on the elytra are quite obsolete; the peculiar broad depressed elytra, long legs, and comparatively narrow thorax will, however, serve to distinguish them, for they cannot be confounded with any other species.

H. lineatus, F. Oval, convex, with the elytra strongly acuminate behind, closely but distinctly punctured, rather strongly pubescent; head and thorax testaceous red, the latter with anterior and posterior

margins usually more or less narrowly dark; elytra fuscous with the exterior margin and several indistinct lines testaceous red; these are often obsolete, and the whole surface except margins appears fuscous; underside red, shiny; male with the anterior tibiae narrowed internally towards base, anterior and intermediate tarsi plainly dilated. Long. 3, lat. $1\frac{3}{4}$ mm.

Ponds and ditches inland and on the coast; common and widely distributed throughout England and Wales, although somewhat local in places; Scotland, local, Lowlands, Tweed, Tay, Solway; Ireland, near Belfast.

H. Scalesianus, Steph. Oblong oval, very sparingly pubescent, somewhat shiny; head and thorax reddish, the latter impunctate on disc, antennae long; elytra rather dark ferruginous, distinctly and rather strongly punctured, strongly narrowed towards apex; abdomen and breast blackish; anterior tarsi with the third joint elongate; male with the anterior and intermediate tarsi a little broader than in female, the claws of the former thick and elongate. Long. 2, lat. 1 mm.

Very local; originally taken by Mr. Scales in Norfolk, but the locality has been lost; it appears to be only found now in Askham Bog near York, where it is not uncommon at certain seasons of the year, although never plentiful.

H. neglectus, Schaum. Oblong, rather narrow, very scantily pubescent; head red, thorax pitch-black, elytra reddish brown; thorax narrower than elytra, sparingly punctured on disc; elytra rather strongly and diffusely punctured, somewhat parallel-sided, posterior third gradually narrowed to apex; underside black; third joint of anterior tarsi elongate; anterior and intermediate tarsi broader in male. Long. $2\frac{1}{3}$, lat. $1\frac{1}{5}$ mm.

Rare; first taken in Britain by Dr. Power at Lee Pit; it has also occurred on Camcock Chase and in Askham Bog, York.

This is one of our smallest unspotted species; it most closely resembles *H. tristis* in form, colour, and sculpture, but is much smaller, more depressed, and rather less parallel, and the sides of the thorax are more curved; it is also allied to *H. umbrosus*, from which it differs by its somewhat smaller size, more elongate and parallel form, entirely ferruginous legs and head, and less pubescent, more finely punctured elytra.

H. tristis, Payk. Oblong, feebly convex, somewhat depressed on disc of elytra, very sparingly pubescent, not very shining; head reddish in front; thorax black with sides almost straight, diffusely punctured or almost impunctate on disc; elytra rather parallel-sided, reddish brown, rather strongly punctured; underside black; the sexes are scarcely distinguishable. Long. 3, lat. $1\frac{1}{2}$ mm.

Very local; seems chiefly but not entirely to affect peaty soils on moors and in mountainous districts: Swansea; Barnmouth; Snowdon district; Teesdale; Repton (W. Garneys); Askham Bog; abundant on the Northumberland Moors in mossy holes; Scotland, common in the Tay, Dee, and Solway districts. Ireland, Armagh.

This species is at once distinguished from *H. umbrosus* by its larger size, much straighter sides of elytra, scantier pubescence, and more

diffuse punctuation; compared with *H. morio*, Dej. (*atriceps*, Crotch), it is smaller, flatter and more oblong with the sides of the thorax less narrowed in front: apart from this, however, its reddish head and brownish colour will at once distinguish it.

H. umbrosus, Gyll. Oval, rather convex, parallel-sided, rather dull; head reddish in front, thorax black, elytra brownish; thorax plainly but diffusely punctured on disc; elytra closely but very distinctly punctured with the sides somewhat rounded; tarsi dilated in both sexes; the sexes are hard to distinguish: there appear to be two forms of the species, one being somewhat more elongate and more brightly coloured than the other, but, according to Dr. Sharp, they are not specifically different, and both of them are alike in having the apical ventral segment more distinctly punctured than is the case in the allied species. Long. $2\frac{1}{2}$, lat. $1\frac{1}{3}$ mm.

Ponds, &c., local; rare near London, Woking, &c.; Walthamstow; Horning Fen, Woodbastwick, and other Norfolk localities; Askham Bog; Northumberland district, Gosforth, somewhat rare; Scotland, local, Forth, Tay, Clyde, Moray.

The distinctions between this species and the two preceding are mentioned above: it somewhat resembles in shape *H. obscurus*, but is smaller, differently coloured, much more strongly pubescent, and more closely punctured; the angle made by the thorax and elytra viewed sideways is very evident in this species, whereas in *H. obscurus* the outline is continuous.

H. angustatus, Sturm. Oblong oval, elongate, plainly pubescent, black underneath, upper side ferruginous with head, and often thorax, red; antennæ long and slender: thorax sparingly punctured on disc, rather strongly at base, base with depressions on each side more or less evident; elytra at base slightly broader than base of thorax, with sides somewhat rounded, closely and distinctly punctured; third joint of the anterior tarsi elongate; male with the anterior tarsi strongly dilated, and the claws thickened, intermediate tibiae sinuate internally. Long. 3, lat. $1\frac{1}{2}$ mm.

Ponds, &c.; not uncommon and widely distributed throughout England and Wales. Scotland, scarce, Lowlands, but widely distributed as far north as the Moray district.

In size and colour this species somewhat resembles *H. obscurus*, but may at once be distinguished by its more oblong shape, longer antennæ, and the very evident angle formed by the sides of thorax and elytra, as well as by the more or less visible depressions at the base of thorax, which are wanting in *H. obscurus*, in which insect the base is much less strongly punctured.

H. Gyllenhalii, Schiodte (*piceus*, Steph.). Oblong oval, rather convex, shining, almost without pubescence, very strongly punctured, colour dark pitchy castaneous, often lighter towards margins of elytra, legs red; thorax plainly punctured on disc, but much less strongly than on margins; sides of thorax and elytra viewed sideways forming a strong

angle; breast and abdomen black; tarsi rather broad in both sexes. Long. $3\frac{1}{2}$, lat. 2 mm.

Ponds, &c.; widely distributed throughout the country from the New Forest to Northumberland; common in the London district in several localities; Scotland, local. Forth, Tay, Moray; Ireland, near Waterford.

This species is unlike any other that we possess, and is at once distinguished by its dark castaneous colour, convex and shining upper-surface, and the very strong punctuation.

H. morio, Dej. (*atricaps*, Crotch). Oblong oval, plainly but rather scantily pubescent, black with legs fuscous; thorax narrowed in front, with the base strongly punctured, disc somewhat raised and finely punctured; elytra distinctly punctured, more so in male than female, somewhat dilated behind middle in some specimens, which are apparently females; male with the anterior and intermediate tarsi more dilated than in female, claws of the former larger; female dimorphic, one form being shining as in male, the other dull. Long. $3\frac{1}{2}$, lat. $1\frac{3}{4}$ mm.

A very local and somewhat rare species, affecting, as a rule, boggy and high districts, especially in the north. Askham Bog; Cheviot Hills; local in Scotland, Highlands, Tay, Dee, Moray and Solway districts.

This insect is not the *melanorephalus*, Steph., Marsh, under which name it stands in many of the older cabinets.

This species is distinguished from *H. tristis* by its darker colour, fuscous legs, rather wider form, and different sculpture especially in female; the head is black, and not red as in *tristis*; it bears a considerable resemblance to dark and unicolorous specimens of *H. vittula*, from which it may be distinguished by its coarser punctuation, darker legs, and less oval form. Mr. Bold's *H. elongatulus* (erroneously identified) appears to be referable to this species.

H. vittula, Er. (*ambiguus*, Aubé). Oval, rather convex, plainly pubescent, dull, underside black, upper surface fuscous, with the head more or less rufous, but often nearly black; sides of thorax narrowly and obscurely reddish; elytra with more or less obscure testaceous markings at sides and towards base, which are often almost, if not quite, obsolete, and are seldom plain; the thorax is finely but distinctly punctured on disc, more strongly on margins; elytra closely but plainly punctured, a little more evidently in male than in female; legs darker or lighter red or fuscous; male with tarsi more strongly dilated than female, the anterior ones with claws equal. Long. $3\frac{1}{4}$, lat. $1\frac{2}{3}$ mm.

Ponds, &c.; local; not common near London (Dulwich, Lee, Cowley, Horsell, Reigate, &c.); Whittlesea Mere; Horning Fen; Askham Bog (where a dark and very confusing variety occurs); Northumberland district; Scotland, scarce, Forth, Solway, Clyde; Ireland, near Waterford, and Killarney.

This species comes near *H. palustris*, but is smaller, proportionally shorter, less narrowed behind, and darker, with the light markings much less distinct; the head and sides of thorax, also, are darker. Dr. Sharp

considers that it will probably prove a variety of *H. striola*, Gyll., to which species it bears an exceedingly close resemblance.

***H. palustris*, L.** Oblong oval, rather elongate, very strongly pubescent, under side black, upper side fuscous with the head and sides of thorax plainly red, the former more or less dark on each side of vertex; thorax closely punctured on disc, more strongly on margins; elytra closely punctured with the margins and markings at base and apex of elytra more or less plainly testaceous; occasionally, but rarely, these are almost obsolete; legs red; male rather dull, but less so than female, the latter sex with elytra more closely punctured; anterior and intermediate tarsi of male dilated, claws of former unequal. Long. $3\frac{3}{4}$, lat. *vic* 2 mm.

Ponds, &c.; common in stagnant water throughout the kingdom; varieties occasionally occur in which the testaceous spots are almost if not quite obsolete, and the whole insect is of a reddish or fuscous colour. *H. tinctus*, Clark, is to be referred to one of these: the specimens from which it was described were taken by Turner in the New Forest.

***H. incognitus*, Sharp.** Very like the preceding, but larger and broader with the pale markings less developed and not so distinct from the ground colour; moreover, the form is different and more like that of *H. erythrocephalus*, the sides of the elytra being more rounded; the punctuation of the elytra is rather more distinct than in *H. palustris*, the pubescence rather finer and more sparing; the whole upper surface is less opaque, and the tarsi are slender, the sexes being hard to distinguish; the prosternal process also is more slender. Long. $3\frac{3}{8}$, average lat. 2 mm.

Rare; Cambridge; a single specimen near Sheerness apparently referable to this species (Champion); Northumberland; Scotland, rare, Solway, Forth, Tay, Moray.

This species is also closely allied to *H. vagripictus*, Fairm., but is distinct from it, being smaller, and having the distinction between the sexes much less marked.

***H. erythrocephalus*, L.** Oval, convex, strongly pubescent; head red with the vertex on each side fuscous; thorax black, with the margins strongly and disc finely punctured, sometimes almost smooth, side margins more or less obscurely reddish; elytra fuscous with the side margins and base lighter; legs red, antennæ fuscous with base lighter; male with the elytra closely but plainly punctured rather shining, with anterior and intermediate tarsi dilated; female dimorphic, one form being like male, the other dull and obsoletely punctured: the latter form is the *H. deplanatus*, Aubé. Long. 4, lat. $2\frac{1}{8}$ mm.

Ponds, &c.; common and widely distributed throughout the kingdom.

H. derelictus, Clark, is a variety of this species with the sides of elytra more parallel and the apex more acuminate; the original specimens came from the Orkneys, and Dr. Sharp has specimens from Inverness-shire; there appears, however, to be no real specific character to separate it.

II. rufifrons, Duft. Oblong oval, rather convex, very scantily pubescent; head ferruginous in front and behind, thorax with side margins obscurely lighter, strongly punctured on margins, disc very finely punctured, almost smooth; elytra fuscous with the base and exterior margins obscurely ferruginous or testaceous; legs ferruginous, antennae fuscous with lighter base; elytra closely and rather strongly punctured; male with the anterior and intermediate tarsi slightly dilated. Long. 5, lat. $2\frac{5}{8}$ mm.

A very local species; ponds, &c.; Wimbledon; Chobham; Coombe; Cambridge, Huntingdonshire, and Norfolk Fens; Askham Bog (sometimes common); Northumberland, Boldon Flats (not uncommon); Scotland, rare, Tweed, Dee, and Clyde districts; Ireland, near Belfast.

This species resembles the preceding, but is easily distinguished by its larger size, more shining appearance, scanty pubescence, and somewhat stronger punctuation.

H. longulus, Muls. (*celatus*, Clark). Oval, not elongate, with short and very scanty pubescence, either somewhat shiny or dull, black or pitchy with antennae and legs red, head sometimes reddish; thorax finely punctured on disc, elytra closely and distinctly punctured, the punctures becoming obsolete towards apex, sides somewhat rounded; anterior tibiae and tarsi rather broad: this species is rather variable, some specimens being duller and some having the elytra more distinctly punctured than others; there is also a considerable difference in size and in the punctuation of disc of thorax, and in some examples the elytra are rufescent towards apex. Long. $3-3\frac{1}{2}$, lat. $1\frac{7}{8}$ mm.

Rare; running water; Surbiton, Bradgate Park, Black Park, Tilgate Forest (Power); Malvern Hills (Sharp); Snowden (Brewer); Cheviots (Sharp); Scotland, rare in Highland districts in trickling water, Forth, Tay, Dee, Moray (Braemar, Mamsoul, Thornhill, Pitlochry, &c.).

II. longicornis, Sharp (*parallelus*, Sharp). Oblong oval, rather narrow and elongate, almost without pubescence, head black or pitchy black almost impunctate; antennae long and slender, either clear red, or more usually with the joints (except the two or three basal ones) somewhat infuscate; thorax black, with the extreme sides somewhat reddish, sides very little narrowed in front, with the middle parts impunctate, the punctures towards margins being distinct and close; elytra black, distinctly and moderately closely punctured, the punctures at margins and apex being indistinct, each elytron with two longitudinal rows of larger punctures; legs red; the sexes are very difficult to distinguish. Long. $3\frac{3}{8}$, lat. $1\frac{1}{4}$ mm.

Very rare; Rannoch, Perthshire (Sharp); north of Northumberland (Bold); Wales (recorded by Sharp); the species has also been found in Finland and Savoy.

This species is closely allied to *H. melanarius*, but is rather narrower and more elongate, and has the elytra more finely punctured; the antennae also are more elongate: the two punctured lines on the elytra,

which are very evident in this species, are hardly traceable in *H. melanarius*; in form and colour it somewhat resembles *H. morio*, ♂, but is more parallel, less distinctly punctured, and has the thorax more distinctly margined; the angle, too, formed by the sides of elytra and thorax viewed sideways is more obtuse than in that species (Dr. Sharp says it is about the same, and it may certainly be regarded as one of the transitional species, but on a comparison of Dr. Sharp's own types the angle formed by the sides appears distinctly more obtuse than in average specimens of *H. morio*).

H. melanarius, Sturm (v. *monticola*, Sharp). Oblong oval, almost without pubescence, black or pitchy, antennæ and legs red; thorax punctured on margins, disc smooth or almost smooth; elytra parallel-sided rather strongly and diffusely punctured, punctures obsolete towards apex which is usually of a lighter colour; this is a somewhat variable species in size, sculpture, and even in form; some examples are dull and less distinctly but not more closely punctured than others, which are shining and very distinctly punctured; *H. monticola*, Sharp, was described from these smaller, duller, and more finely punctured specimens. Long. $3-3\frac{1}{2}$, lat. $1\frac{1}{4}-1\frac{3}{4}$ mm.

Ditches and mossy holes amongst Sphagnum, rare. London district, Esher and Lee Pit (Power), Woking (Champion); as a rule these specimens from near London are larger than the more northern forms; on Cannock Chase I took a specimen in 1879 intermediate between the type and the variety; Askham Bog; Northumberland district, mossy holes on moors, rare; Scotland, rare, Highlands, Tay, Moray, Solway. Dr. Sharp's original specimen of *H. monticola* came from Glen Affrick, Inverness-shire.

The differences between this species and the preceding are mentioned above: from *H. morio*, ♂, it may at once be distinguished by its more pitchy colour, red legs and antennæ, impunctate disc of thorax, and shorter and more parallel-sided elytra.

H. memnonius, Nic. Oblong oval, rather depressed, almost without pubescence, pitchy, or pitchy black with the anterior and posterior margins of head and sides of thorax more or less distinctly ferruginous; antennæ and legs red, the former somewhat elongate; thorax with sides only slightly narrowed in front, with the margins strongly and the disc finely punctured; elytra rather closely and strongly punctured; abdomen and breast black; male shining and plainly punctured, female dimorphic, one form being like male, and the other very dull and finely punctured, and usually entirely of a castaneous colour: this form is the *H. castaneus*, Aubé. Long. 4, lat. $2\frac{1}{8}$ mm.

Ponds, ditches, &c., either in woods or open spaces; rather local, but widely distributed throughout the country; also rather common in Scotland in lowland districts as far north as Morayshire.

H. obscurus, Sturm. Oval, rather convex, scantily pubescent, rather shiny, red or fuscous red with the head, base of antennæ (which are short), and legs lighter; thorax with the disc broadly smooth,

anterior and posterior margins brownish, punctured; base with a depression near posterior angles; elytra rather strongly punctured; breast black; sexes indistinguishable externally. Long. $2\frac{1}{2}$, lat. $1\frac{1}{2}$ mm.

Ponds, &c.; local and not very common, although widely distributed; London district, Lee, Reigate, Horsell, Woking; New Forest; Snowdon; Askham Bog; Skiddaw; Northumberland district; Scotland, not rare, Tay, Dee, Solway, Clyde, Moray; Ireland, Killarney.

This is a very distinct little species, which may at once be known by its reddish colour, smooth upper surface, rather strong punctuation, and small size; it is usually placed near *ambrosius*, but bears very little resemblance to that insect, which is smaller, narrower, of darker colour, much more evidently pubescent, more finely punctured, and with much longer and more slender antennæ: the sides of thorax and elytra viewed sideways are continuous, a point which separates it from *H. tristis*, with which it is sometimes compared; it is also smaller than that species, differently coloured, and has shorter and thicker antennæ.

H. nigrita, Fab. (*glabellus*, Thoms.). Oval, rather broad, finely pubescent, slightly shining or dull, black or pitchy; antennæ fuscous with base red, legs red; thorax with margins punctured, disc with a few scattered punctures, almost smooth; elytra distinctly and rather strongly punctured, punctures obsolete towards apex; apex of abdomen usually impunctate; sexes indistinguishable externally. Long. 3, lat. $1\frac{1}{2}$ mm.

Ponds, wells, small streams, &c.; widely distributed and not uncommon throughout the greater part of the country; Scotland, common in lowland and highland districts as far north as Morayshire; Ireland, near Belfast and Dublin, and probably widely distributed.

H. discretus, Fairm. Very like the preceding, of which it has been considered by some authors a sexual variety: the punctuation is much closer and the pubescence less scanty, and the upper surface is brighter and not finely and densely coriaceous, and therefore dull, as in *H. nigrita*; the disc of thorax also is much more evidently punctured; sexual differences very slight. Long. 3, lat. $1\frac{1}{2}$ mm.

Local; Lee, Esher, and Birdbrook, Essex (Power); Hastings (Butler); Northumberland district; Scotland, local, Lowlands, Tay, Solway: this and the preceding species appear to inhabit clear water either still or running; Mr. Bold says that a runner from a spring on the moors is a favourite locality.

This species comes very near the preceding, but the distinctions are very evident if specimens are compared side by side; it appears to be more closely allied to *H. corsicus*, Wehneke, and *H. nauter*, Fairm., than to *H. nigrita*.

H. pubescens, Gyll. (*maculirocephalus*, Marsh?). Oval, rather convex, dull, strongly pubescent, evenly, finely, and thickly punctured, head and thorax black, elytra fuscous with the shoulders often lighter; antennæ fuscous with base red, legs obscurely red; last segment of abdomen widely and deeply punctured; anterior tarsi with the third joint small. Long. $3\frac{1}{2}$, lat. $1\frac{1}{2}$ mm.

Ponds, &c. ; one of the commonest of the Dytiscidæ not only in Britain, but also throughout Europe, extending from Finland to Algeria, and from Britain to Northern Persia ; the thick pubescence and fine punctuation at once distinguish it from *H. nigrita* ; the elytra also are longer in proportion ; from *H. discretus* it may be separated by its shape, thicker pubescence, and lighter base of elytra.

H. planus, F. Oval, not very convex, very plainly pubescent, thickly and finely punctured, head and thorax black, elytra fuscous with the base and shoulders more or less obscurely testaceous, legs reddish, antennæ fuscous with red base ; last segment of abdomen pubescent with the apical half thickly punctured ; male with the front tarsi broader than in female. Long. $4-4\frac{1}{2}$, lat. $2-2\frac{1}{3}$ mm.

Ponds, &c. ; one of the commonest species throughout the kingdom ; it varies somewhat in colour and also in size ; it is most closely allied to the preceding, from which it may always be distinguished in doubtful cases by the larger third joint of the front tarsi and the sculpture of the apical ventral segment.

H. lituratus, F. (*xanthopus*, Steph.). Oval, rather convex, shining, plainly but rather scantily pubescent, distinctly but rather finely punctured, head and thorax black, the latter less evidently punctured on disc than on margins ; antennæ and legs testaceous, the former fuscous towards apex ; elytra fuscous or brownish, with the margins and base more or less broadly and distinctly testaceous ; last abdominal segment indistinctly punctured ; the colour, sculpture, and pubescence are somewhat variable ; the sexes are hard to distinguish. Long. $3\frac{1}{2}$, lat. 2 mm.

Stagnant ponds, especially in woods ; not uncommon and widely distributed from south to north ; Scotland, local, Lowlands, Tweed, Forth, Solway ; Ireland, Armagh (?).

H. marginatus, Duft. This species in form and general appearance rather closely resembles *H. planus*, but is somewhat larger and broader, and may at once be distinguished by its reddish head (which is lighter in front and behind), broadly testaceous margins of thorax, and extremely dense and fine pubescence and punctuation ; the elytra are variable in colour, being usually fuscous or fuscous-brown with the sides, apex, and base more or less broadly testaceous ; in some specimens the testaceous colour prevails ; legs red, antennæ fuscous with red base ; underside black ; male with the anterior tarsi considerably broader than in the female : the species may at once be distinguished by its sculpture. Long. $4\frac{1}{2}$, lat. $2\frac{1}{2}$ mm.

Ponds, &c. ; one of our rarest Dytiscidæ, although there seems no reason why it should not be found in greater numbers ; in fact it is probable that it is occasionally passed over in mistake for *planus* ; Twyford and Eglington, near Repton, Burton-on-Trent (W. Garneys, who at the time did not recognize it, or might have secured more) ; Marlborough (Hart Smith) ; Knowle, near Birmingham, and Cannock Chase (Blatch) ; first taken in Britain by Hamlet Clark at Woburn, Bedfordshire.

H. ferrugineus, Steph. (*victor*, Aubé). Oblong oval, depressed, almost without pubescence, somewhat shiny ; head large, red with darker disc ; thorax ferruginous with the sides lighter, sparingly punctured on disc, strongly on borders, side margins strong, base impressed on each

side; elytra ferruginous with the base and other obscure markings lighter, closely and distinctly punctured; antennæ and legs red; tarsi with the third joint large; sexes almost indistinguishable. Long. 4, lat. 2 mm.

Rare; running water, especially among moss on mountains and in high localities; the original specimens of Stephens were taken by Mr. Rudd at Collingbourne Wood near Marlborough, and in a stream near Kimpton, Andover; Whalley, near Preston, Lancashire; Snowdon; Scotland, local, Lowlands and Highlands, Forth, Tay, Moray.

H. obsoletus, Aubé (*Ashurorthii*, Power). Oval, rather depressed, shining, without pubescence; head red in front, darker behind; thorax and elytra testaceo-ferruginous with the disc of former dark and the latter more or less obscurely mottled with lighter markings; thorax with disc smooth, depressed on each side towards posterior angles, depressions strongly punctured; elytra very finely punctured with large and plain scattered punctures; antennæ and legs red; breast and abdomen black; the sexes are apparently indistinguishable externally. Long. 4, lat. 2 mm.

Rare; North Wales; Scarborough and Scalby Beck, Yorkshire; Gosforth, Northumberland; Scotland, rare, Solway district (Sharp); Balmuto (Fifeshire) (Power; one or two specimens at a time in a small pool in a burn after a storm); Dr. Sharp notes that the occurrence of this species in Britain is strange, as it is a native of Syria and Southern (more especially South-Eastern) Europe.

H. oblongus, Steph. (*nitidus*, Sturm). Oblong oval, rather elongate, without pubescence, shining; head dark reddish, antennæ testaceous red, apex of last joints fuscous; thorax pitchy with sides lighter, very finely punctured on disc, more plainly on margins; elytra pitchy castaneous, with sides, base, and shoulders lighter, rather sparingly and very distinctly punctured, punctuation more close towards apex; legs red; underside almost impunctate; in the male the anterior and middle tarsi are somewhat dilated, and joints 3-7 of the antennæ are slightly stouter than in the female. Long. 5, lat. $2\frac{1}{3}$ mm.

Ponds, &c.; rare; discovered by Dr. Power near Cambridge; Horning Fen; Askham Bog, York (not uncommon in early spring, although it always occurs sparingly).

COLYMBETINA.

Dr. Sharp (l. c. p. 190) divides his complex Colymbetides into two tribes, Agabina and Colymbetina, the former having a group of cilia on the posterior external angle of the hind femora, whereas in the latter it is absent. Dr. Horn prefers the character presented by the semi-membranous piece bordering the inner edge of the first ventral plate, which in his first group Agabi is smooth, and in his second group Colymbetes is rugose; this latter method of division is of advantage as including several of Dr. Sharp's unassociated genera: the only one of these in our fauna is *Copulatus* (*Liopterus*), which resembles the Agabina in having the semi-membranous piece above referred to smooth, and the Colymbetina in having no group of cilia on the hind femur; with our

limited number of genera the best plan would seem to be to regard the *Colymbetina* as one tribe including the genera *Agabus*, *Platambus*, *Ilybius*, *Copelatus*, *Rhantus*, and *Colymbetes*, the genus *Copelatus* forming a transition between the first three and the last two; they may then be divided as follows:—

- I. Posterior external angle of hind femora furnished with a little group of cilia.
 - i. Claws of posterior tarsi unequal ILYBIUS, *Er.*
 - ii. Claws of posterior tarsi equal.
 1. Wings of metasternum variable in size but always distinctly wedge-shaped, never linear; epipleuræ of elytra narrower AGABUS, *Leach.*
 2. Wings of metasternum slender and linear; epipleuræ of elytra flat and broad behind middle PLATAMBUS, *Thoms.*
- II. Posterior external angle of hind femora without group of cilia.
 - i. Claws of posterior tarsi equal COPELATUS, *Er.*
 - ii. Claws of posterior tarsi unequal.
 1. Sides of thorax margined; elytra not transversely striolate RHANTUS, *Lac.*
 2. Sides of thorax not margined; elytra transversely striolate COLYMBETES, *Clairv.*

AGABUS, Leach.

In this genus the sides of the prothorax have a raised margin, and the terminal joint of the palpi is not thickened; the genus comprises about a hundred species from Europe, Northern Asia, and North America, and a considerable number of species standing under other generic names are probably referable to it; it is very difficult to determine the species, as they are so much alike in general appearance, although in obscure points of structural difference they vary exceedingly from species to species: the following table may be found of some service, but in each case the more minute differences must be carefully compared: the species are of moderate size, being on an average about 8 or 9 mm. long, and are either black, bronze, or lighter or darker testaceous, unicolorous, or with a variety of markings; the sculpture of the elytra nearly always consists of a fine reticulation, the size and shape of the meshes often affording a good character for the distinction of the species; on each elytron there are usually two or three irregular rows of large punctures, which however are sometimes very indistinct in the dull females.

The larva of *Platambus* (*Agabus*) *maculatus* is figured by Schiödte (ii., Pl. vi., Fig. 1): it is elongate-ovate, somewhat depressed, strongly acuminate behind, pale, with the head and the dorsal seta fuscous-black spotted and marked with whitish-yellow; head narrow almost orbicular, prothorax narrower than mesothorax with sides very strongly rounded, narrowed in front; seventh and eighth abdominal segments very narrow, cylindrical, cerci very long proceeding from the apex of the eighth segment, furnished in middle and at apex with long setæ; legs rather long with very long equal claws.

- I. Wings of metasternum very slender.
 - i. Disc of elytra with yellow bands and markings *A. ABBREVIATUS, F.*
 - ii. Disc of elytra unicolorous *A. FEMORALIS, Payk.*
- II. Wings of metasternum moderate or rather large.
 - i. Male with a series of striae forming a stridulating file on each side of the third abdominal segment; upper surface dark bronze.
 1. Form narrower; elytra parallel-sided *A. AFFINIS, Payk.*
 2. Form broader; elytra with sides slightly rounded *A. UNGICULARIS, Thoms.*
 - ii. Male without stridulatory organ on the third abdominal segment.
 1. Upper surface black, strongly and coarsely reticulated.
 - A. Upper surface with strong distinct scratches forming a longitudinal reticulation.
 - a. L. 9-10 mm.; base of thorax slightly sinuate in middle *A. BIPUSTULATUS, L., and v. Solieri, Aubé.*
 - b. L. 6-7 mm.; base of thorax truncate *A. STRIOLATUS, Gyll.*
 - B. Upper surface with strong scratches forming a coarse reticulation without any definite direction *A. MELANARIUS, Aubé (larsatus, Zett.).*
 2. Upper surface very smooth, unicolorous reddish brown; swimming legs short and stout *A. BRUNNEUS, F.*
 3. Upper surface very smooth, brownish testaceous, clouded with more or less well-defined dark markings and spots.
 - A. Femora entirely testaceous; disc of thorax with two black spots (which are rarely obsolete) *A. NEBULOSUS, Forst.*
 - B. Femora brownish towards base; disc of thorax always without spots *A. CONSPERSUS, Marsh.*
 4. Upper surface brownish or blackish bronze, smooth and shiny, with a yellow spot on each elytron just behind middle, and sometimes another at apex.
 - A. Elytral spot behind middle waved; hind coxae rather large; wings of metasternum large *A. DIDYMUS, Ol.*
 - B. Elytral spot behind middle simple, sometimes indistinct.
 - a. Base of thorax sinuate in middle, sides converging from base to front; male with anterior claws distinctly toothed *A. BIGUTTATUS, Ol. (nitidus, F.).*
 - b. Base of thorax straight, sides not converging before anterior third; male with anterior claws simple *A. GUTTATUS, Payk.*
 5. Upper surface unicolorous bronze, with at most extreme edges of elytra

and thorax lighter, besides the usual reddish spots on vertex of head.

A. Form larger, longer, and more depressed; legs ferruginous, femora dark

A. CHALCONOTUS, *Panz.*

B. Form smaller, narrower, and more convex; legs clear red or testaceous; male shining, female (var.) very dull

A. ULIGINOSUS, *L.*

6. Upper surface dark with margins broadly red, finely but plainly reticulate and dull.

A. Form broad, oval

A. STURMII, *Schön.*

B. Form narrow, oblong

A. ARCTICUS, *Payk.*

7. Thorax dark; elytra brownish yellow or reddish, passing from a lighter to a darker shade, but with no distinct markings.

A. Upper surface very shiny

A. PALUDOSUS, *F.*

B. Upper surface rather dull

A. CONGENER, *Thunb.*

The species are arranged below under their several groups as given by Dr. Sharp; there are no British representatives of the groups that are omitted.

Group II.

Outline of elytra and thorax either continuous or but slightly discontinuous; prosternal process comparatively broad, nearly flat, evenly and distinctly margined, shining and impunctate; wings of metasternum large; sexual differences of sculpture, as a rule, very slight; male fore feet but little developed.

A. guttatus, *Payk.* Oblong oval, bronze-black, shining, rather depressed; labrum, two spots on vertex of head, antennæ, and palpi red; thorax with sides strongly margined, a little broader at base than apex, posterior angles right angles; elytra somewhat parallel-sided, rugose towards apex, smoother and more shining towards base, with two more or less distinct testaceous spots on each, one behind middle and one at apex; legs varying in colour, sometimes clear red, sometimes more or less piceous; elytra of female near base finely but distinctly reticulate; in the male the reticulation is less distinct, and the surface near base almost appears finely and closely punctured. Long. 8, lat. 4 mm.

Ponds, &c.; generally in clear water with streams running through it; not uncommon and widely distributed throughout England and Wales, although somewhat local; Scotland, abundant both Lowlands and Highlands; Ireland, Armagh.

A. biguttatus, *Ol. (fontinalis, Steph., nitidus, Steph.)*. Oblong oval, shining black, rather depressed; head with two spots on vertex usually red; antennæ red with the apex as a rule black, palpi piceous; thorax with base sinuate, sides somewhat contracted in front, lateral margins not strong; elytra with two testaceous spots on each, one behind middle, the other at apex, both small and inconspicuous, the latter often obsolete; female less shining than male; the reticulation, however, varies

very much; the species, as a rule, is larger, more convex, and more shining than the preceding, and has the elytral spots less distinct: the toothed anterior claws of the male will also serve to distinguish it. Long. 9, lat. $4\frac{1}{2}$ mm.

Running streams; local, although widely distributed; Maidstone; Dartmoor; Bristol; Llangollen; Isle of Man; Hartlepool; Northumberland district; Scotland, local, Tweed, Forth, Moray.

This species is one of the most widely distributed of the Agabi, ranging over Central and Southern Europe to North Africa and Central Asia with innumerable variations of sculpture, and considerable differences of colour.

A. paludosus, F. Oval, rather convex, very smooth and shining; head dark with front and two spots on vertex red, antennæ testaceous red; thorax dark with borders red; elytra brownish yellow or castaneous with the sides and base lighter; posterior legs pitchy, anterior and intermediate ones red with femora pitchy in middle; no sexual differences of sculpture; male with the basal joints of the front and middle tarsi a little thickened. Long. 7, lat. 4 mm.

Widely distributed, and not uncommon, although local; generally in running water, but not always; it occurs throughout the country from Northumberland to Devonshire, and from South Wales to the London district; Scotland, rather scarce, but widely distributed in the Tweed and eastern districts; it apparently does not occur in the Solway and western ones. Ireland, Cork, and near Belfast.

Group IV.

Characters similar to those of the highly developed members of the preceding group, except that the swimming legs are strongly developed, being short and thick; one species only is contained in the group.

A. brunneus, F. (*ferrugineus*, Steph.). Oval, broad, convex, smooth and very shiny, outline of thorax and elytra continuous; under side black (except of head and thorax), upper side castaneous, with obscure markings occasionally on head and thorax, elytra somewhat lighter at sides and base; legs red, all the femora in middle, and posterior tibiae pitchy; female apparently dimorphic, one form being much more plainly reticulated and duller than the male; Dr. Sharp does not notice this fact, but there are several of the duller forms in Dr. Power's collection. Long. 9, lat. $5\frac{1}{4}$ mm.

Very rare; taken originally (according to Stephens, Mand. ii. 79) by Dr. Leach in South Devon; rediscovered by Dr. Power in June 1862 in the New Forest, in a stream near Lyndhurst, where it was afterwards taken by Charles Turner in some numbers.

Group VII.

Hind coxæ small, wings of metasternum large, hind tarsi feeble; no abdominal file; prosternal process in our single species moderately broad, feebly punctate (in some of the other species of the group it is quite smooth).

A. uliginosus, L. (*dispar*, Bold). Oval, convex, shining, upper surface bronze black; head with two obscure spots on vertex reddish; thorax and elytra with margins narrowly red, base of latter occasionally lighter than disc; thorax strongly margined; elytra short and broad, narrowed towards apex but not acuminate; underside black, abdominal segments more or less reddish behind; legs red; female dimorphic, one form being like male, the other very thickly reticulate and quite opaque and dull; male with the front tarsi considerably thickened, claws of front feet short, anterior one thickened so as to appear dentate in middle. Long. 7, lat. $4\frac{1}{4}$ mm.

Very local; ponds in bogs, &c.; Askham Bog, near York, not uncommon; Northumberland district, Boldon Flats, &c., in some numbers; recorded by Murray from Edinburgh and Aberdeenshire, but Dr. Sharp considers it very probable that individuals of *A. congener* may have been mistaken for it; the dull variety of the female appears to be confined to Britain: it is not uncommon at Askham Bog.

This species may at once be distinguished from its allies by its shorter, broader, and more convex form: it somewhat resembles *A. femoralis* at first sight, but that insect is much more parallel-sided, more depressed, and quite differently sculptured.

Group VIII.

Male with a series of striae forming a stridulatory organ on each side of the third abdominal segment; prosternal process rather narrow, very little compressed, nearly smooth or feebly punctate; wings of metasternum moderately large.

A. affinis, Payk. Oblong oval, rather depressed on centre of disc, bronze-black, shining, very finely reticulate; elytra with a longitudinal patch near margin just behind middle and a spot near apex testaceous red; these markings are very obscure, and are often quite obsolete; antennæ and legs red, femora more or less pitchy; anterior claws of male with a sharp tooth; the sculpture of the sexes is almost identical. Long. $6\frac{1}{4}$, lat. $3\frac{1}{2}$ mm.

Very local; only taken near Dumfries, where it has been found by Dr. Sharp, and subsequently by Mr. Lennon in some numbers.

A. unguicularis, Thoms. Extremely like the preceding, but less parallel (the sides of the thorax behind and of the elytra being more rounded); the general colour is more brassy, and the broad turned-under margin of the base of the elytra is obscure red, whereas in *affinis* it is quite black; there is also some difference in the size of the wings of the metasternum, but quite insufficient to warrant their being placed in two different genera, as is done by Thomson, who places *unguicularis* under *Eriglenus*, and *affinis* under *Gauvodytes*, relying chiefly on this character, which is a very unsatisfactory one except in extreme cases. Long. $6\frac{1}{4}$, lat. $3\frac{1}{2}$ mm.

Widely distributed, although local; ponds, &c.; London district, Lee, &c.; York-

shire, Askham Bog; Netley; Norfolk; Cambridge; Northumberland district; Scotland, not common, Lowlands, Tweed, Forth, Solway, Clyde.

From *A. femoralis* and *A. uliginosus* these species may be superficially distinguished by not having the margins of thorax and elytra lighter.

Group IX.

Hind coxae moderate, or rather large; wings of metasternum moderate; prosternal process acuminate, finely margined; swimming legs rather stout; elytra marked with yellow.

***A. didymus*, Ol. (*vitreus*, Payk.).** Oval, rather convex, broad and robust, rather shining, almost smooth, upper side bronze, with the edges of thorax and epipleurae of elytra reddish; elytra with a waved testaceous mark near the side just behind middle formed by the junction of two spots which are very rarely separated, and another pale spot near apex, which are both conspicuous and at once distinguish the species; antennae testaceous, legs pitchy-red: male with the front and middle tarsi distinctly thickened. Long. 8, lat. $4\frac{3}{4}$ mm.

Running water; local, but widely distributed; London district; New Forest; Dartmoor; Swansea; Cambridge; Repton and other midland localities; Bridlington, York-shire; Northumberland district; becomes rarer in the north of England, and has not been recorded from Scotland.

Group X.

Anterior tarsi of male never much thickened, their claws more or less elongate, their under surface bearing distinct but not large palettes; prosternal process elongate, never broad, not keeled; wings of metasternum rather large.

***A. congener*, Payk.** Oval or oblong oval, feebly convex; head and thorax black, sometimes with labrum, two spots on vertex of head, and side margins of thorax reddish; elytra fuscous, fuscous-red, or reddish with the sides and base usually lighter; antennae and legs red, femora darker; prosternal process long, narrow, acuminate, and impunctate; male with elytra bearing only obscure traces of reticulation, female with sculpture varying from that of male to an extremely dense and distinct reticulation which makes the whole surface appear opaque; colour of elytra also very variable. Long. 7, lat. 4 mm.

This appears to be essentially a northern, alpine or subalpine species; it has been recorded from Suffolk, Norfolk, and near London, and also from Askham Bog, York, but all these localities require confirmation; Northumberland district, "taken near the top of Cheviot by Mr. J. Hardy"; Scotland, abundant in mossy pools in high districts; Tweed, Tay, Dee, and Solway.

***A. nebulosus*, Forst. (*bipunctatus*, F.).** Oval, rather depressed, shiny, underside black; head black with mouth, clypeus, and two spots on vertex more or less plainly testaceous; thorax testaceous with two more or less distinct, occasionally obsolete, dark spots on disc; elytra testaceous with irregular variegated dark markings; legs, including

femora, testaceous; the sculpture of the male and female differs very little, but the female has the base of the elytra very minutely and finely reticulate or coriaceous. Long. $8\frac{1}{2}$, lat. $4\frac{1}{2}$ mm.

Common and widely distributed throughout Great Britain and Ireland; it is found in stagnant water.

A. conspersus, Marsh. This species closely resembles the preceding, but is rather smaller, and may at once be distinguished from ordinary specimens of *A. nebulosus* by the absence of the two spots on disc of thorax; from those specimens in which the spots are obsolete it may at once be separated by the colour of the femora, which are always more or less broadly fuscous; the sculpture of the female is extremely variable, sometimes being as in male, whereas forms occur in which the close and fine reticulation gives the insect a very dull and opaque appearance; between the extreme forms various intermediate gradations occur. Long. 8, lat. $4\frac{1}{2}$ mm.

A maritime species, found usually near the coast in brackish ponds and ditches; widely distributed, and by no means uncommon, although rather local; it appears to get rare in the north of England, and is not recorded from the Northumberland district; in Scotland it occurs near the sea in the Forth and Solway districts, where it is local.

A. striolatus, Gyll. Oblong oval, somewhat elongate and narrow, black, rather dull, with antennæ and legs red; upper side plainly reticulate, the meshes of the reticulation being distinctly longitudinal; thorax with the posterior angles obtuse; sculpture of sexes similar; male with the three basal joints of the front and middle tarsi a little thickened and furnished beneath with the usual glandular hairs. Long. 7, lat. 4 mm.

Very rare; has only been taken in Horning Fen, Norfolk (chiefly by Mr. Laundry Browne), and has not occurred for many years; it is a rare species on the Continent, although extending from Finland to the basin of the Seine.

Group XIV.

Hind coxæ large with acutely arched upper border, wings of metasternum very slender; prosternal process rather small; legs rather slender; male front tarsi but little thickened.

A. femoralis, Payk. Oval, rather depressed, bronze black, shining, with the front of head, two more or less obscure spots on vertex, and margins of thorax and elytra rufescent; antennæ and legs red, the former darker, as a rule, towards apex; elytra very finely reticulate and plainly punctured besides the irregular rows of larger punctures; thorax with broad lateral margin; underside of thorax brown-red, breast and abdomen black, hinder segments of the latter more or less reddish behind; male with front and middle tarsi slightly thickened; sculpture the same in both sexes. Long. 6, lat. $3\frac{1}{2}$ mm.

Ponds, &c.; local and not common; Wimbledon, Woking, Walthamstow; Bound-

stone, The Holt, near Farnham; Norwich, St. Faith's; Stronsall, near York; Northumberland and Durham district; Scotland, local, Lowlands, but widely distributed, Tweed, Forth, Tay, Solway, Clyde, and Moray districts.

A. abbreviatus, F. (*undulatus*, Schr.). Oval, convex, shining, very finely reticulate, underside pitchy with hinder segments of abdomen reddish behind; upper surface bronze; head and margins of thorax red; elytra with a very plain waved testaceous band near base stretching across their whole breadth but, as a rule, not quite reaching suture, a waved spot behind middle connected with the basal marking by a lateral band, and another near apex which is small and sometimes indistinct; antennae and legs red; elytra very finely punctured besides the usual larger punctures; male with the anterior and intermediate tarsi a little thickened. Long. $7\frac{1}{2}$, lat. 4 mm.

Ponds, &c.; very local; abundant in Askham Bog, where it is the commonest member of the genus at some seasons of the year (I have taken it in profusion in August with Archdeacon Hey); also recorded from Shropshire, Windsor, Leominster, &c.; formerly abundant in the Fen districts, Whittlesea Mere, &c.; one of the most distinct of the British species, and known at once by its colouration, which is quite peculiar to it.

Group XVII.

Prosternal process flat, very finely, or indistinctly, margined; male with posterior tarsi much thickened, and furnished beneath with remarkably large palettes; wings of metasternum only moderately large; swimming legs moderately long and stout; surface conspicuously reticulate.

A. arcticus, Payk. Oblong oval, rather narrow, not very convex, dull; head black with mouth and two more or less distinct spots on vertex red; thorax black with margins and a broader or narrower band across disc reddish-testaceous; elytra black with margins broadly light, antennae and legs red, the former with apex of last joints fuscous; upper side very closely and irregularly reticulate; lateral margins of thorax very fine; male with the front claws unequal, the anterior shorter and furnished with an angular projection; reticulation of upper surface very deep in female. Long. 7, lat. $3\frac{3}{4}$ mm.

A northern species extending across North Europe and Arctic Siberia to North America; Northumberland district, Whittingham near Alnwick (G. Wailes); Cheviots (J. Hardy); Scotland, local, Highlands, Forth, Tay, Dee, Solway, Clyde, Argyll, Moray, and probably extending to the extreme north.

A. Sturmii, Gyll. Oval, rather convex, dull, finely and closely reticulate; head and thorax black, somewhat aneous, margins of latter broadly testaceous; elytra fuscous with sides broadly testaceous, antennae and legs reddish, apex of last joints of former, and middle of femora of latter blackish; lateral margin of thorax fine; male with the front claws elongate and of about equal length, apical joint of middle tarsus very elongate; sculpture of sexes identical. Long. 8, lat. $4\frac{1}{2}$ mm.

Ponds, &c.; widely distributed and not uncommon in stagnant water in England and Wales and in Scotland; Ireland, near Belfast and Armagh, and probably common.

Group XIX.

Coxal lines in their anterior part but little directed outwards; prosternal process rather broad but always compressed; wings of metasternum large or moderate.

A. chalconotus, Panz. Oval, rather depressed, upper side blackish bronze, with the sides of thorax and elytra sometimes very narrowly rufescent; mouth and two spots on vertex more or less obscurely red; under side black, abdominal segments reddish behind; antennæ red, apex of last joints dark; anterior and intermediate pairs of legs red, femora pitchy, posterior pair entirely pitchy; upper surface finely and thickly reticulate; male with the three basal joints of front and middle tarsi slightly thickened and apical ventral segment rugose towards apex especially on each side of the middle; size very variable. Long. 6-8, lat. $3\frac{1}{2}$ - $4\frac{1}{2}$ mm.

Ponds, &c.; common and widely distributed from Newcastle to Dartmoor, and from Swansea to the London district; Scotland, rather common as far north as Morayshire; Ireland, near Dublin and Belfast.

Group XX.

Coxal border very wide; the coxal lines gently, not abruptly turned outwards at the extremity; prosternal process punctulate, slightly raised along the middle.

A. melanarius, Aubé (*tarsatus*, Zett.). Oblong oval, rather shiny (the male more so than the female), somewhat depressed, black with a slight aeneous reflection which is, as a rule, hardly perceptible; antennæ red; legs pitchy; head with two obscure red spots on vertex; each elytron with an obscure reddish dash on margin near apex; upper surface strongly and plainly reticulate, the meshes of the reticulation taking no definite direction; this character, together with its larger size and more shining appearance, separates it from *A. striolatus*, which it most closely resembles; male with the three basal joints of the anterior and middle tarsi slightly thickened. Long. 9, lat. 5 mm.

Very rare; a single specimen in Dr. Power's collection taken in the Orkneys by Mr. Syme; Mr. Bold in his catalogue records a specimen from Long Benton, Northumberland, but I have not seen the insect, nor do I know of any person who has verified it.

A. bipustulatus, L. Oval, not very convex, black, upper surface sometimes with a very slight metallic reflection, very strongly reticulated, the meshes narrow and at all events at base taking a distinctly longitudinal direction; antennæ and palpi red, apex of last joints of former often darker; legs pitchy, the anterior pair lighter; male with the three basal joints of the anterior and intermediate tarsi thickened, the claws

unequal, the front one being moderately long, and the hinder one elongate and much dilated behind; female duller than male with the striae finer and denser. Long. 10, lat. $5\frac{1}{2}$ mm.

Ponds and stagnant water generally; very common and widely distributed throughout the kingdom.

This species is extremely variable in sculpture; in the highland districts of Britain (Snowdon, North of England, and Scotch Highlands) the specimens become smaller, and of a narrower, more oblong and depressed form; the males also become more shining and smooth, and one form of the females much duller, so that the disparity between the sexes appears much greater than in the type form: this is the *Agabus Solieri*, Aubé, and is called by Dr. Sharp "the dimorphic Alpine form" of *A. bipustulatus*; it appears distinct at first sight, but is connected with the ordinary temperate European form by every intermediate gradation; the colour is also variable, the elytra being sometimes reddish.

PLATAMBUS, Thomson.

This genus comprises three species, one from Asia Minor and the Caucasus, another from Japan, and the third occurring in Europe from Sweden and Finland to Spain.

A. maculatus, L. Oval, rather convex; head red with more or less distinct dark markings, thorax reddish testaceous with anterior and posterior margins more or less broadly black; elytra very variously coloured, ranging from quite dark with margins and a few spots testaceous, to testaceous with more or less regular dark markings, which are usually broad, confluent, and longitudinally arranged; thorax with lateral margins fine, posterior angles acute; elytra smoother towards base than at apex; prosternal process broad, acuminate at apex; male with front and middle tarsi slightly thickened; the sculpture and colour is variable, but the disparity is not sexual. Long. $7\frac{1}{2}$ –8, lat. $4\frac{1}{4}$ mm.

Common and widely distributed in running streams throughout England and Wales; Scotland, common throughout the greater part of the country; a small dark variety occurs at Aylsham (T. Wood), unaccompanied by the type, but these forms are more usually found in Scotland (Braemar, &c.).

ILYBIUS, Erichson.

This genus comprises upwards of thirty species, which are peculiar to Europe, North and Central Asia, Japan, and North America; seven of these are British, two or three of which require some care to distinguish them.

The larva of *Ilybius fenestratus* is figured by Schiödte (ii., Pl. vi., Fig. 9): in shape and general appearance it so closely resembles the larva of *Platambus maculatus* that there is hardly need of a separate description: the head is rather more quadrate, and the thorax longer and somewhat differently shaped, having the base truncate and not strongly sinuate; the seventh and eighth abdominal segments are very much

narrowed and cylindrical as in *P. maculatus*, but the eighth joint is plainly constricted in the middle; the claws are rather short, equal: the pupæ very much resemble each other, but that of *I. fenestratus* is longer and more parallel-sided.

I. Upper surface of a brown bronze colour plainly metallic.

- i. Elytra with a broad yellow lateral border I. FULIGINOSUS, F.
- ii. Elytra without lateral yellow border.

- 1. Hind tarsi of male with the joints externally margined at their lower edge I. SUBÆNEUS, Er.

- 2. Hind tarsi of male with the joints not externally margined at their lower edge I. FENESTRATUS, F.

II. Upper surface black with a slight bronze reflection.

- 1. Length 8-9 mm.; apical ventral segment of male not distinctly longitudinally rugose I. ÆNESCENS, Thoms.

- 2. Length 13-14 mm.; apical ventral segment of male very plainly longitudinally rugose I. ATER, De G.

III. Upper surface deep black without trace of bronze reflection.

- 1. Length 11 mm.; male with claws of anterior tarsi toothed I. OBSCURUS, Marsh.

- 2. Length 9 mm.; male with claws of anterior tarsi simple I. GUTTIGER, Gyll.

I. fuliginosus, F. (*uliginosus*, L.). Oval, rather narrow, convex, not very shiny, under side testaceous red, upper surface æneous with the head and sides of thorax more or less obscurely ferruginous; elytra with margins broadly testaceous from base almost to apex; upper side very thickly and finely reticulate; male with the front and middle tarsi a good deal thickened, and furnished beneath with long hairs bearing narrow palettes; last ventral segment covered with long although not deep wrinkles, and having a short raised keel in the middle; female with a large emargination at the apex of this segment, and in the middle a coarse prominence or short fold. Long. 10, lat. 5 mm.

Clear and running water; common and widely distributed throughout the kingdom.

I. subæneus, Er. Oval, convex, not elongate, under side pitchy or rufous, upper side æneous with margins of thorax and elytra lighter; antennæ and legs red; upper surface finely and densely reticulate, elytra with two obscure pale spots; the body is broadest in and not behind the middle; male with the whole of the apical portion of last ventral segment covered with coarse longitudinal striæ, without any trace of central keel; female with this segment appearing deeply notched at apex, with two or three wrinkles on each side; in *I. fenestratus* the male has a strongly developed keel, and the posterior coxæ are more produced towards the intermediate coxæ. Long. $11\frac{1}{2}$, lat. 6 mm.

Very doubtful as British; its claim to be admitted into our lists rests on a single specimen taken twenty years ago by a friend of Mr. Newman's at Peckham; Dr. Power determined the species: it has, however, never been found since, and requires further confirmation.

I. fenestratus, F. Oval, convex, under side ferruginous, upper side æneous with margins of thorax and elytra narrowly lighter, some-

what shiny, densely and finely reticulate; antennæ red; each elytron with an elongate testaceous patch about middle near the side, which is indistinct and often obsolete; posterior coxæ almost reaching intermediate ones; male with anterior and intermediate tarsi furnished with more distinct palettes than the preceding species, from which it is further distinguished by characters given above: it is also of a more brassy colour than *I. submarginatus*, and by this is distinguished from all the other species except *I. fuliginosus*, which is at once known by the broad testaceous margin of the elytra. Long. $11\frac{1}{2}$, lat. 6 mm.

Ponds, &c.; not uncommon, but rather local; Lewisham, Croydon, Woking and other places in the London district; Walthamstow, Essex; Swansea; Soham, Cambridge, and few districts generally; Daventry; Leominster; Stamford Bridge, York; Northumberland district, rare; not recorded from Scotland.

***I. ater*, De G.** Oval, very convex, black with slight metallic reflection, under side pitchy; antennæ red; legs more or less pitchy, posterior pair darkest; upper side finely and densely reticulate, each elytron with a more or less obscure pale dash behind middle, towards sides; male with the three basal joints of the front and middle tarsi distinctly thickened and much compressed, apical ventral segment with a keel on the middle of its hinder part, and longitudinally wrinkled on each side; female with this segment compressed in middle, and so apparently notched at the extremity. Long. 14, lat. $7\frac{1}{2}$ mm.

Ponds, &c.; widely distributed and, as a rule, common throughout the country; Scotland not common, in marshes, Lowlands, Tweed, Forth, Tay, Solway, Clyde; Ireland, local, near Dublin.

***I. obscurus*, Marsh.** Very like the preceding, but smaller, and black without a trace of metallic reflection; the reticulation of the elytra is more obsolete at apex than in *I. ater*; the apical ventral segment of male is only slightly rugose on each side of the raised keel (whereas in *I. ater* it is distinctly rugose), and the extremity of this segment in the female appears less emarginate; the tarsal hairs of the male are less developed, and bear much smaller palettes. Long. $11\frac{1}{2}$, lat. 6 mm.

Ponds, &c.; not uncommon and widely distributed, especially in the Midlands and south-east of England; Scotland, rare, Lowlands, Tweed, Forth, Clyde; Ireland, near Belfast and Armagh.

I. scaberrimus, Schiödte, is a variety of this species, distinguished by the strongly dentate outer claws of intermediate tarsi of male; it has been taken at Cambridge and near Liverpool, and in other localities.

***I. guttiger*, Gyll.** Oval, convex, rather narrow, black without trace of metallic reflection, elytra closely and finely reticulate with a small testaceous spot on each, sometimes indistinct; antennæ red, legs pitchy; male with front and middle tarsi slightly thickened and furnished with moderately long hairs bearing minute palettes; outer claw of hind feet a good deal shorter than the inner one, somewhat

thickened, with obtuse extremity; male with a short keel on the last abdominal segment and no longitudinal wrinkles; female with this segment broadly but shallowly emarginate, and in the middle a thick short projection. Long. $9\frac{1}{2}$, lat. $4\frac{3}{4}$ mm.

Ponds in bogs, &c.; local; appears not to occur in the London district; Askham Bog and Strensall, Yorkshire; Lake district; Northumberland; Scotland, rare, Lowlands, "Paisley, Mr. Young;" Ireland, near Dublin.

I. ænescens, Thoms. Very like the preceding, but with a distinct æneous reflection; it cannot, however, be satisfactorily distinguished except by the sexual characters; the apical ventral segment of the male has a very short carina at apex and no distinct longitudinal wrinkles; the outer claw on the hind feet is very little shorter than the inner, and has the apex rather sharp; the apical ventral segment in the female is broadly and shallowly emarginate as in the preceding species, but has in the middle hardly any projection. Long. $8\frac{3}{4}$, lat. $4\frac{5}{8}$ mm.

Ponds in bogs, mossy pools, &c.; local, but rather widely distributed; Weybridge; Woking; Esher; St. Faith's, Norwich; Fen district, Whittlesea Mere, &c.; Northumberland district, rare (J. Hardy); Scotland, scarce, Lowlands and Highlands, Tay, Dee, Solway; Ireland, near Dublin, and also near Waterford (Power).

The specimens standing in British collections under *I. angustior* must all be referred to this species; the true *I. angustior* does not appear to have occurred in Britain; it is larger than *I. ænescens* and rather broader than *I. guttiger*, and the apical segment of the male has a sharply elevated keel, and is wrinkled, with elongate coarse striæ.

COPELATUS, Erichson.

This genus comprises upwards of one hundred species, which are widely distributed throughout the warmer parts of the world; one species only occurs in Europe, which has been included by some authors under *Agabus*.

C. agilis, F. (*Liopterus agilis*, auct. *oblongus*, Ill., *ruficollis*, Schall). Oblong, moderately convex, rather shining, castaneous; head smooth in front, strongly punctured behind, where it is more or less black; thorax with anterior margin somewhat darker; antennæ and legs clear testaceous red; upper surface extremely finely reticulate and covered with very short striæ; elytra with well marked but irregular rows of large punctures; breast and abdomen black; in the male the short striæ on the thorax have a tendency to take the form of punctures, and the front and middle tarsi are dilated. Long. $7\frac{1}{2}$, lat. $3\frac{1}{2}$ mm.

Ponds, &c.; local, but widely distributed; London district generally; Deal; Hastings; Walthamstow; Cambridgeshire Fens; Lincoln; Exeter; Askham Bog, York; not found in the Northumberland district, and very doubtful as Scotch (the only record being "Rachills, Dumfriesshire, Rev. W. Little," Murray's Cat.); Ireland, near Belfast (Haliday).

RHANTUS, Lacordaire.

This genus comprises about forty known species, although there are a good many more assigned to other genera that probably belong to it; they are widely distributed throughout the world, there being very few parts where the genus is not represented by one or more species.

1. Base of thorax sinuate on each side near posterior angles;
colour black **R. GRAPII**, Gyll.
11. Base of thorax almost straight; upper side more or less
testaceous.
 - i. Under side entirely testaceous **R. EXOLETUS**, Forst.
 - ii. Under side wholly or partially black.
 1. Thorax with a transverse dark spot on disc.
 - A. Antennæ entirely testaceous; abdomen unicolorous black **R. PULVEROSUS**, Steph.
 - B. Antennæ with last joints ringed with black; abdomen more or less testaceous **R. NOTATUS**, Berg.
 2. Thorax with anterior margin narrowly and posterior margin broadly marked with black; first abdominal segment black **R. BISTRIATUS**, Berg.
 3. Thorax unicolorous red, or at most with small markings on posterior margin darker; first abdominal segment testaceous **R. ADSPERSUS**, F.

R. Grapii, Gyll. Oval, rather depressed, somewhat long and narrow; black, upper surface very closely and finely reticulate and rather dull; antennæ and palpi testaceous; legs more or less pitchy; margins of thorax and elytra obscurely pitchy-brown; thorax strongly sinuate at base on each side, so that the posterior angles are produced; internal posterior claw double as long as the external; male with the front and middle tarsi thickened and compressed with four rows of small palettes. Long. 11, lat. $5\frac{1}{2}$ mm.

Ponds, &c.; local, but not uncommon where it occurs; London district, Lee, Birch Wood, Reigate, Forest Hill, Horsell, Woking; Horning Fen, Norfolk; Cambridgeshire Fens; Askham Bog, York (common at certain seasons of the year); not recorded from the extreme north of England or Scotland.

This species is often confounded by beginners with *Agabus bipustulatus*, and species of *Hybius*; from the former it is at once distinguished by its sculpture, and from the latter by its elongate and depressed form.

R. exoletus, Forst. Oval, slightly convex: head testaceous, with dark markings more or less distinct; antennæ testaceous, apical joints partially black; thorax testaceous, unicolorous or with two dark spots at base touching basal margin; elytra testaceous variegated with close and fine dark markings which are more or less confluent and cover the whole surface except margins and extreme base; upper surface very finely reticulate, elytra with more or less distinct rows of larger punctures; legs testaceous; male with the front tarsi rather thickened and a good deal compressed with moderately large palettes; sculpture of the sexes identical: the species is easily distinguished by the testaceous underside. Long. 10, lat. $5\frac{1}{2}$ mm.

Ponds, &c. ; not uncommon, although rather local ; London district ; Norfolk and Huntingdonshire Fens ; Swansea ; Willington, near Burton-on-Trent ; Askham Bog and Stamford Bridge, York ; Northumberland and Cumberland ; Scotland, local, but widely distributed ; Ireland, Armagh.

R. pulverosus, Steph. Considerably larger than the preceding ; head testaceous with dark markings ; thorax testaceous with a transverse black spot on centre of disc ; elytra coloured as in *R. exoletus*, except that the fine dark markings are more confluent, and give the insect a more fuscous appearance ; underside black, coxal processes lighter ; antennæ and front pairs of legs testaceous, posterior pair pitchy ; male with the basal joints of front and middle tarsi slightly incrassate and very compressed, and furnished beneath with four rows of narrow elongate palettes. Long. 12, lat. $6\frac{1}{2}$ mm.

Ponds, &c. ; rather common in the London district, but very local elsewhere ; Hastings ; Willington, near Burton-on-Trent ; it has been recorded from Exeter, Swansea, and Yorkshire, and is rare in Northumberland ; very doubtful as Scotch, "Forfarshire, Rev. W. Little, Murray's Cat.," being the only record.

This species has an almost wider range than any other ; it reaches right across Central and Southern Europe and Asia to China and Japan, and is very abundant in Australia, New Zealand, and New Caledonia.

R. notatus, Berg. Smaller and narrower than the preceding ; upper surface coloured in much the same fashion except that the dark markings are not so confluent, and are divided as a rule by very narrow irregular testaceous lines ; antennæ testaceous with apex of last joints black ; legs testaceous ; underside of male black, abdominal segments with hind margins and markings testaceous ; of female testaceous spotted with black at the sides ; male with basal joints of anterior tarsi much thickened and very little compressed, presenting a broad sole with rather large palettes. Long. $10\frac{1}{4}$, lat. $5\frac{1}{2}$ mm.

Ponds, &c. ; very local ; London district, not uncommon ; Gravesend, Whitstable, Sheerness, Wandsworth, Reigate, Strood, Rainham ; fen districts of Cambridge, Norfolk, &c. ; Aberystwith ; Carlisle ; Scotland, rare, Tweed, Forth, and Dee districts ; I can find no record between these localities, but the species probably occurs in Yorkshire and Northumberland.

R. bistriatus, Berg. Oval, not very convex, underside black, with the prosternum, and usually the hind margins of the abdominal segments reddish ; head testaceous with black markings, thorax testaceous with the anterior margin narrowly and obscurely, and the posterior margin broadly and sharply black ; elytra coloured as in the preceding species, except that the markings are darker and more confluent and give the insect a blacker appearance ; antennæ and legs reddish testaceous, apical joints of former partly black ; male with front tarsi considerably thickened and furnished with four rows of moderately large palettes. Long. 10, lat. $5\frac{1}{2}$ mm.

Ponds, ditches, &c. ; local in England ; not uncommon throughout the London district ; Hastings ; Exeter ; Repton, Burton-on-Trent ; Norfolk and Cambridge-shire Fens ; Strensall, near York ; Northumberland ; Scotland, common in both Lowlands and Highlands, and widely distributed.

R. adpersus, F. This species superficially very closely resembles *C. exoletus*, being coloured like that insect on the upper side; it is, however, rather broader, more widened behind, and more plainly reticulate; it may at once be distinguished by the colour of the under side, which is black with the prosternum, first segment, and apex, and hind margins of other segments of abdomen testaceous, the breast also being reddish in the middle; male with the front tarsi considerably thickened and not much compressed with moderately large palettes underneath. Long. $9\frac{1}{2}$, lat. $5\frac{1}{2}$ mm.

Very rare; has only occurred near Cambridge, where it was found in 1829 in numbers; of late years it seems to have disappeared.

Dr. Sharp in his collection has a specimen of *Hylaticus leander*, Rossi, given him by Mr. Crotch as a British example of *R. adpersus*.

COLYMBETES, Clairville.

This genus comprises about twenty species, which are chiefly found in the northern parts of Europe and Asia and in North America; they are nearly all over 15 mm. in length, and some reach to 18 or 20 mm.

The larva and pupa of *C. fuscus* are figured by Schiödte (ii., Pl. ii., Fig. 6, Pl. iii., Fig. 2): the larva bears a resemblance to an elongated peg-top, like other of the Dytiscide larvæ, the eighth segment being very much elongated and cylindrical; the head is rounded, narrower than prothorax, and furnished with strong simple mandibles; the prothorax is very large with the margins broadly explanate and somewhat reflexed; the rest of the segments as far as the seventh, which is much constricted, are very short; the cerci which proceed from the end of the eighth segment are rather long, thickly ciliated and terminating in long setæ; the colour is pale yellow with a thin fuscous line running down the centre of the scuta and a few other darker markings at sides; the claws are long, almost equal, slightly pectinate at base.

C. fuscus, L. Oval, rather elongate, moderately convex, underside black; head black, with front and two spots behind red; thorax fuscous with borders more or less broadly testaceous, elytra fuscous with sides testaceous; antennæ and anterior pairs of legs red with femora pitchy, posterior pair blackish; thorax finely strigose, elytra distinctly transversely reticulate, with obscure wavy striation, with irregular rows of larger punctures; abdomen with the second segment on each side near middle with longitudinal wrinkles; male with the basal joints of the front and middle tarsi moderately dilated and much compressed, and furnished beneath with four series of rather large, round palettes; sculpture of sexes identical. Long. 16, lat. $8\frac{1}{4}$ mm.

Ponds, ditches, and slowly moving streams and small rivers; common and widely distributed throughout the greater part of England, Wales, and Ireland; not so common in the north; Scotland not common, but widely distributed, and reaching as far north as the Orkney Islands.

DYTISCINA.

The members of this tribe are characterized by having the abdominal

stigmata of the two last segments much enlarged; the swimming legs are comparatively slender and furnished with two nearly equal claws; in the male the three basal joints are much dilated and joined together so as to form a round disc: only two genera are comprised in the tribe, *Hydrotus* containing three Australian species which have no yellow margin to the elytra, and *Dytiscus* in which it is always present.

DYTISCUS, Linné.

This genus comprises about twenty species, which are peculiar to the northern parts of the Old and New Worlds, and do not reach the tropics; the females are usually deeply sulcate from the base to beyond middle, but are often dimorphic, one form resembling the male in sculpture: one of the best distinguishing characters is the shape of the apex of the process of posterior coxæ; besides the yellow marginal stripe of elytra, the clypeus is always yellow, the colour being sharply divided off from the dark colour of the front of head; in all our species the labrum is distinctly emarginate.

The larva of *Dytiscus marginalis* is a very common object; it has been repeatedly figured, but the best figure is by Schiödte (ii., Pl. iii., Fig. 6); it is also depicted by Westwood (Classification, i. 95, Fig. 5, 14): it is fusiform, narrowed in front and behind and broadest in the middle; the head is very large and almost orbicular, and attached to the prothorax by a distinct neck; the mandibles are simple and very large, and furnished on the inner side towards apex with a suctorial orifice; the prothorax is trapezoidal, narrowed in front, and much longer than broad; the seventh and eighth abdominal segments are much constricted, cylindrical, and very long, and the eighth is terminated by two short cerci which are thickly furnished with swimming hairs; by means of these cerci the insect can suspend itself at the top of the water, and they are moreover organs of respiration; the legs are rather long and slender and are ciliated on the inside, so that they serve as oars; these larvæ are of a dirty brown colour with scattered darker markings; they are exceedingly voracious; during the summer the larva is said to attain its full size in about fifteen days, when it leaves the water and makes a cell in the adjoining earth, where it changes into a pupa of a whitish colour, and appears in the perfect state in a fortnight or three weeks; it is, however, some little time before the beetle arrives at a state of maturity. The larva of *Cybister Roeseli* much resembles that just described, but it is longer and more slender and the cerci are entirely absent.

Six species are found in Britain, which may be characterized as follows:—

- I. Underside black; female not dimorphic D. PUNCTULATUS, F.
- II. Underside testaceous or reddish, sometimes marked with black, sometimes unicolorous.
 - i. Apices of coxal processes acuminate; female dimorphic.
 1. Coxal processes short; abdomen unicolorous . . D. MARGINALIS, L.
 2. Coxal processes prolonged into a sharp point.
 - A. Abdomen with black markings.
 - a. Head without yellow border round eyes . . D. CIRCUMFLEXUS, F.
 - b. Head with broad yellow border round eyes . D. LAPPONICUS, Gyll.
 - B. Abdomen unicolorous; head with a narrow yellow border round eyes D. CIRCUMCINCTUS, Ahr.
 - ii. Coxal processes quite blunt; female not dimorphic . . D. DIMIDIATUS, Berg.

D. punctulatus, F. Pitchy black above and beneath with sides

of thorax and elytra yellow, antennæ red; legs pitchy black; prosternal process elongate, rather acuminate; coxal processes rounded; elytra with a longitudinal impression behind middle; male shining, female dull, more closely punctured, deeply sulcate from base to beyond middle. Long. 27-29, lat. 13-14 mm.

Ponds and slowly running streams; widely distributed and not uncommon throughout England and Wales; Scotland, local and not common but widely distributed. Ireland, near Belfast and Dublin.

***D. marginalis*, L.** (♀ var. = *conformis*, Kunze). Olive black above with the margins of elytra and the whole border of thorax yellow, testaceous beneath with the metasternum dark in the middle, antennæ and legs red, posterior pair more or less pitchy; prosternal process broad not elongate, coxal processes short, rather acuminate; male shining, female dimorphic either sulcate and dull, or as in male except that the elytra are more closely punctured towards apex; size variable. Long. 26-34, lat. 16-18 mm.

By far the commonest of our species; found in ponds and pools throughout the kingdom: it ranges across Northern Europe and Asia to Japan and North America.

***D. circumflexus*, F.** (♀ var. = *purpureus*, Lac.). Rather elongate; upper side olivaceous, sometimes greenish, with margins of elytra and the whole border of thorax yellow; scutellum yellowish; under side testaceous marked with black; antennæ and legs red, posterior pair more or less pitchy; prosternal process rather elongate; coxal processes very long, narrow, and sharp; male shining, female dimorphic, sulcate and dull, or as in male except that the elytra are more punctured towards apex. Long. 28-35, lat. 16-17 mm.

Not common; found chiefly in the London district; Lee; Peckham, Lewisham, Norwood, Camberwell, Battersea, Red Hill, Sheerness; formerly recorded from Swansea and from Lawrence Waltham, Berks; it is chiefly a South European species.

***D. circumcinctus*, Abr.** (♀ var. = *dubius*, Gyll.). Upper side blackish or olivaceous with the margins of elytra and the whole border of thorax yellow or yellowish red, under side testaceous, with metasternum dark in middle, antennæ and legs red, posterior tarsi pitchy; prosternal process broad, not elongate; coxal processes narrow and acuminate, but not much prolonged; male shining, female dimorphic, sulcate and dull, or as in male, but with the elytra more strongly punctured towards apex; very like *D. marginalis*, but distinguished by the acute coxal processes, and the narrow yellow border round eyes; the punctuation also on the thorax of the sulcate females is finer; in Dr. Power's collection there is a female that comes between the two forms, the sulci being only rudimentary but distinctly traceable. Long. 32, lat. 16 mm.

Rare; Cambridge Fens (Whittlesea Mere, Wicken Fen, &c.); Deal; Eastbourne; Askham Bog, York; it is found in North America.

***D. lapponicus*, Gyll.** (♀ var. = *splendrionalis*, Gyll.). Upper sur-

face pitchy with the margins of elytra and the whole border of thorax yellow, scutellum yellowish, elytra with very fine yellow longitudinal lines which are sometimes plain, sometimes almost obsolete; under side testaceous with the sides of abdomen spotted with black; antennæ and legs testaceous; prosternal process short; coxal processes elongate and acuminate; male shining with elytra strongly punctured towards apex, female dimorphic, sulcate and dull, or as in male except that the thorax is more closely and finely punctured in the middle. Long. 25-28, lat. 14-15 mm.

Very local, but sometimes not uncommon where it occurs; found in Highland lakes in Scotland in the Moray, Clyde, and Argyle districts; it is not uncommon in Mull; Ireland, Donegal, in tarns; taken in some numbers by Mr. Somerville.

D. dimidiatus, Berg. The largest of our species, and at once distinguished from all the others except *D. punctulatus* by having only the side margins of the thorax broadly yellow; with the latter species it need hardly be compared, being a great deal larger and having the under-side ferruginous with the metasternum pitchy in the middle; the elytra are somewhat widened behind; the thorax has a very narrow light border in front; antennæ and legs red, posterior tarsi black; prosternal process rather elongate, acuminate; coxal processes blunt; male shining, female always sulcate, the sulci reaching hardly beyond middle. Long. 32-37, lat. 17-18 mm.

This species used to be locally abundant in the Cambridgeshire and other fens, but of late years has become exceedingly rare: the last specimen taken in Britain was found three or four years ago in Askham Bog, York, by the Rev. W. C. Hey.

In Dr. Power's collection there is a specimen of *Cybister Roeseli* labelled as follows: "Found Sept. 30th, 1826, in a puddle at Walton, Essex, by J. Dane, Esq., who gave it to H. Griesbach, from whose collection it came; this is the specimen alluded to by J. F. Stephens on which it was introduced;" this species cannot be admitted into our lists without further confirmation, but there is no reason why it should not occur, as it is found in Northern France and Belgium, and other species that have long been erased from our lists have been confirmed afterwards (e. g. *Harpalus calceatus*, found by myself at Bridlington after an interval of more than fifty years). *C. Roeseli* resembles a large *Dytiscus*, but is much more depressed, and has the elytra widened behind; the sides of the thorax are testaceous, and the elytra have a broad light band near margin attenuated towards apex and separate from the side margin; the body underneath is testaceous. Long. 34, lat. 18½ mm.

HYDATICINA.

This tribe comprises two genera, one, *Procladius*, from India, containing one species, and the other *Hydaticus*, which is distinguished by the very unequal claws of the posterior tarsi.

HYDATIcus, Leach.

About fifty species are contained in this genus (and probably a good many others now referred to other genera); they are widely distributed over the world both in the northern and southern hemispheres: two of these are British; they may easily be distinguished as follows:—

1. Elytra with a transverse yellow band just before base . *H. transversalis*, Berg.
2. Elytra without transverse band *H. seminiger*, De G.

H. transversalis, Berg. Oval, rather broad, under side pitchy with prosternum and middle of head testaceous; upper side black with the head red in front and with two red spots on vertex; thorax broadly red in front and at sides; elytra with margins broadly testaceous with irregular and interrupted dark thin bands on the light portion, and also with a testaceous transverse band on each near base; anterior pairs of legs red, posterior pair pitchy; antennae red; male with front tarsi moderately large, dilated joints forming a round disc and furnished with suckers. Long. 13, lat. 7 mm.

Ponds, &c.; not common; London district, Battersea Fields (Stephens); Norfolk; Quay Fen and Wicken Fen, Cambridge; Whittlesea Mere; Swansea; Devonshire (?); Askham Bog, scarce, but found occasionally; Mr. Hey sent me a pair taken this year (May 1885); it was last found there in Sept. 1881.

H. seminiger, De G. (*Hylburi*, Fab.). Very like the preceding but broader with no transverse band at the base of the elytra; antennae and anterior pairs of legs red, intermediate tibiae pitchy, posterior legs pitchy; female with the black colour on thorax often more extensive than in the male, and sometimes reaching front margin. Long. 13, lat. $7\frac{1}{2}$ mm.

Ponds, &c.; not common; London district, very local, but occasionally found in some numbers; Lee, Earlswood; in the former locality Dr. Power once took eighty specimens in one day; Whittlesea Mere; Yaxley Fen; Wicken Fen; Askham Bog (rare); recorded formerly from Shropshire.

THERMONECTINA.

In this tribe the suture between the metathoracic episternum and the wing of the metasternum is curved; the spurs of the hind tibiae under a high magnifying power are distinctly emarginate at apex: the tribe contains six genera, of which two are British: these may be distinguished as follows:—

1. Elytra closely and strongly punctate; female always sulcate in our species *Acilius*, Leach.
2. Elytra very finely punctate, apparently smooth; female not sulcate *Graphoderes*, Esch.

ACILIUS, Leach.

This genus as constituted by Dr. Sharp (who separates off a number of the species under *Thermonectes*, Esch.) contains six species, which are peculiar to Europe and North America.

The larva of *Acilius sulcatus* is figured by Schödtte (ii., Pl. iv., Fig. 1), and also by Westwood (Classification, i., p. 100, Fig. 6. 4): it is elongate, broadest in the middle and strongly narrowed in front and behind; the head is oblong ovate, longer than broad, and the prothorax is very long, somewhat constricted in the middle and widened towards base; the remaining segments of the body are short until the seventh, which with the eighth becomes narrowed and cylindrical to apex of the body, which ends in a blunt point from which proceed two short cerci: these are bare, but the sides of the seventh and eight segments are furnished with a thick swimming fringe of cilia; the colour is yellowish with the head and dorsal senta rather darker; the head bears several dark spots (notably a large triangular one on clypeus), and the hind portions of the segments of thorax and abdomen are fuscous, so that the insect appears banded; the legs are long, thickly provided throughout with swimming hairs on their upper and under surface, and terminating in short equal claws. Westwood (l. c. p. 101) observes that "the neck is generally bent downwards and the head turned rather upwards, the parts of the mouth having also the latter direction, so that the animal has the appearance of a small snake: it is extremely insidious in its attacks, the position of the head and neck inducing it to seize objects above rather than in front of it; so that when an object is perceived floating on the surface of the water the larva rises very cautiously until it has nearly reached it, when, by a sudden jerk of the neck, it seizes the object with its jaws, and immediately drags it under water; if it still struggle, the larva endeavours to despatch it by repeated jerkings of the head. When in the water they may constantly be perceived jerking themselves in every direction, probably for the purpose of seizing upon minute insects."

1. Posterior femora with base spotted with black *A. SULCATUS*, L.
2. Posterior femora without black markings *A. FASCIATUS*, De G.

A. sulcatus, L. Broad oval, upper surface depressed, elytra broadest behind middle, head and thorax testaceous, the former with two distinct markings, and vertex, dark, the latter with two transverse black bands across disc which are usually united at the sides by two parallel bands; elytra fuscous testaceous, sprinkled with very fine and close black markings, side margins light, the whole surface distinctly and closely punctured; underside black, prosternum and apex of abdomen testaceous; sides and margins of abdominal segments marked with yellow; anterior pairs of legs testaceous; base of hind femora and hind tibiae and tarsi dark; antennae very long and thin, testaceous, with apex of last joints somewhat fuscous; male with upper surface closely punctured and dull, but not sulcate; elytra of female deeply sulcate almost to apex, thorax with a shallow depression on each side, the sulci and depressions clothed with long yellowish hairs; the three basal joints of the male tarsi are greatly dilated, and bear one very large cupule and two very small ones. Long. 16, lat. 10 mm.

Ponds and ditches; common and widely distributed throughout the kingdom; the Scotch variety (*var. Scoticus*, Curtis) has the elytra and sometimes the whole upper surface almost entirely black, and the legs more or less pitchy: it appears to be only a melanic variety, such as is very common among the Scotch Lepidoptera.

A. fasciatus, De G. (*canaliculatus*, Nic.). Very like the preceding but rather smaller and narrower; the head is somewhat differently coloured, the anterior of the black markings being absent; the black colour is less developed on the ventral segments, and the hind legs are

entirely rufescent without the dark markings at the base of femora; in the female the pubescence at sides of thorax is almost, if not quite, absent, and the third furrow is narrower; the underside is sometimes entirely testaceous. Long. $15\frac{1}{2}$, lat. $9\frac{1}{4}$ mm.

Ponds and ditches: local and much less common than the preceding; London district, Earlswood (Brewer) and Reigate (Linnell); Whittlesea Mere; Huntingdonshire Fens; Scotland, scarce, Lowlands, Forth, Solway, Clyde, and Moray districts; Fife, and Polmont near Glasgow (Power).

GRAPHODERES, Eschscholtz.

This genus contains about a dozen species from Europe, Northern Asia, North America, and Japan; our single British species has been long included under *Hydaticus*, but apart from other differences it may be distinguished by having the claws of posterior tarsi equal, whereas in *Hydaticus* they are very unequal.

G. cinereus, L. Oval, rather broad and convex, shining; head and thorax reddish testaceous, the former with the vertex and other markings black, the latter with two more or less broad black bands on anterior and posterior margins, which are distinct and well marked and reach the front and hind borders, but not the sides; elytra apparently black with very fine and small scattered testaceous markings; margins and a thin line near suture testaceous; underside and legs reddish testaceous; male with front tarsi strongly dilated and furnished with three larger and a number of smaller cupules, thorax rather longer than in the female; sculpture of the elytra identical in the sexes. Long. $14\frac{1}{2}$, lat. $8\frac{1}{2}$ mm.

One of the rarest of the British Dytiscide; it has not been found for many years; in former years it occurred in the Cambridge and Huntingdonshire Fens, and used to be taken by Dr. Power and other collectors.

GYRINIDÆ.

This family is one of the most distinct of the whole order of Coleoptera; it is so anomalous in many points that it might be with reason formed into a sub-order; * its position, however, is a matter of some difficulty; it is almost universally classed with the Adephaga, but it is by no means certain that it can be retained in this connection; at the same time it must be admitted that several of the characters in which its members differ most widely from the Carabidæ and Dytiscidæ are reproduced in individual members of those families, and it is at all events plain that the Gyrinidæ, if separated from the Adephaga, must be regarded as finding in them their nearest allies; the chief differences are as follows:—

1st. The mouth parts of the Gyrinidæ differ very widely from those of the Carabidæ; the broad blunt mandibles resemble those of certain

* Having equivalent value with the Adephaga.

of the Phytophaga, and seem to point to a partially vegetable diet; the lower mouth organs are only slightly of the predaceous type; the sharp sickle-like maxillæ seem certainly predaceous, but they have the outer lobe always undivided, and occasionally (e.g. *Dineutes*) entirely wanting; the former peculiarity, however, is found among the Carabidæ in *Callistus* (rule p. 32).

2nd. The Gyrinidæ possess a pair of eyes on each side of the head, on the upper and lower surface; this appears to be a development caused by their habits, as they swim on the surface of the water, and so require to be on their guard against enemies both from above and below; this peculiarity however, according to Dr. Sharp (Ent. Mo. Mag. v. 52), is repeated in one of the Carabidæ, *Adelotopus*, which is found under bark of trees, and seems to have no need, as far as we can judge, of such an arrangement.

3rd. The antennæ are quite different from those of the Adephaga generally, being very short and thick, with the first joint small, the second large and dilated, the third large and inserted at the side of the second, and the rest very much compressed and so soldered together that it is difficult to determine of how many joints they really consist; in many respects they resemble the antennæ of the Parnidæ.

4th. The structure of the legs is entirely different; both the posterior and middle pairs are modified so as to form swimming paddles, and are arranged so that they can be packed away underneath the surface of the body and offer not the least resistance to rapid motion, while by thrusting out the one or the other leg the insect can at once change its course; hence their rapid motions on the surface of the water; in the Dytiscidæ the hinder pairs only are modified.

5th. In the members of the Adephagous series generally five ventral segments are visible extending right across the body, a sixth being visible only on each side; in the Gyrinidæ, however (as shown by Dr. Horn, Carabidæ, p. 93), the first segment is very long, and is composed of two segments united, the rudiments of the suture being distinctly visible; they have, therefore, six ventral segments reaching across the body, and a seventh visible only on each side.

The Gyrinidæ bear a strong external resemblance to the *Pseudomorphina*, one of the most aberrant of the Carabidæ, but it is merely superficial; the peculiarity of *Adelotopus*, which belongs to these, has been before alluded to; they are connected with the Dytiscidæ by the entire absence of the ante-coxal piece before the hind coxæ, which is large and distinct, and reaches across the greater part of the body in the Carabidæ and Haliplidæ, is very small in the Amphizoidæ and Pelobiidæ, and entirely wanting in the Dytiscidæ and Gyrinidæ.

Dr. Horn is strongly of opinion that in spite of all that may be urged to the contrary the Gyrinidæ must be retained in connection with the Adephaga; Dr. Sharp (Trans. Ent. Soc. 1882, i. 69) is inclined to hold the contrary opinion; Thomson (Skand. Col. i. 113) places them with the Parnidæ and Elmidae in his group Amphibii between the Palpicornia

and the Brachelytra; the question must be left an open one, but for the present it seems best, considering the evidence, not to separate them from the Adephaga; it is quite probable, when we remember the comparatively recent discovery of *Amphizoa* by Mr. Matthews, that further connecting links may be discovered which will settle the question; no series can be stamped once for all as finally completed; the Paussida among the Clavicornia show some strong affinities with the Adephaga, and in other families more or less distant relations with the same series may be observed. The chief work on the group is the "Monographie des Gyrinida," by M. Régimbart, published in the *Annales de la Soc. Ent. Fr.* for 1882-83; as there constituted, the Gyrinida contain nine genera and about two hundred and seventy species; two of these genera occur in Europe, both of which are British; they may be distinguished as follows:—

- | | |
|---|-------------------|
| 1. Labrum transverse, not prominent; upper surface not pubescent, punctured in rows; last abdominal segment rounded and depressed | GYRINUS, Geoff. |
| 2. Labrum semicircular, projecting; upper surface with thick short pubescence, irregularly punctured; last abdominal segment elongate and not depressed | ORETOCHILUS, Lac. |

GYRINUS, Geoffroy.

About seventy species are contained in this genus, which are widely distributed throughout the world; they are usually found in large groups on the surface of the water, on which they move very swiftly, so swiftly in fact, that, when disturbed, the eye can hardly follow their motions; on the approach of danger they usually dive below the surface, but soon reappear; they are among the most familiar of the Coleoptera to the ordinary observer, and are commonly known by the name of "whirligigs" or "steel-coats;" they have in most instances the power of secreting a milky fluid with a disagreeable odour of apples; they are usually of a brilliant bluish-black or steel-black colour above with the rows of punctures reflecting a bright brassy tint; some species, however, are duller, and the females, as a general rule, are duller and larger than the males; the males have the whole of the five joints of the anterior tarsi dilated and furnished beneath with a large number of little round transparent suckers (about fifty on each joint) which form a very beautiful object under the microscope; the Gyrinida, like the Dytiscida, have ample wings, and can fly from one spot to another, when their native pools dry up; hence their sudden appearance on newly formed pools and puddles.

The larva of Gyrinus is as curious as the insect itself; it is figured in Westwood's *Classification*, vol. i., p. 100, Fig. 6, 18, and also by Schiodte, *Nat. Tids. i.*, Pl. iii., Fig. 1; it is chiefly remarkable for the long slender, transparent and membranous filaments which arise from each side of the nine abdominal segments, the terminal joint being furnished with two pairs, and the eight preceding with one pair each; they are fringed with hairs, and are employed as organs of respiration; the larva as a whole is long, narrow and compressed, and resembles closely a small centipede; it is whitish,

with the corneous parts pale yellowish; the head is oval, rather elongate, furnished with two strong jaws, and two short and thin 4-jointed antennæ; the three anterior segments of the body bear each of them a pair of rather slender legs about equal in length to the appendages above referred to; the eggs are laid on aquatic plants; they hatch in about eight days; when the larva has attained its full size it creeps out of the water and spins a whitish cocoon on the stems of rushes or other aquatic plants; in about a month the perfect insect emerges, and immediately returns to the water; the cocoons of *Orectochilus* have been found beneath willow bark a yard from the edge of a river and two feet above the ground; this species in the perfect state affects logs and submerged timber much more than *Gyrinus*. Some of our British species of *Gyrinus* are very hard to distinguish, and it seems to be in several cases a matter of opinion whether they are regarded as species or as varieties; all students of the group should read Dr. Sharp's excellent monograph "On the British Gyrinidæ" in the Entomologist's Monthly Magazine, v. 52; several of his views there expressed he has since modified; the arrangement below appears to represent the present state of our knowledge on the subject, but must in one or two cases be regarded as provisional.

It will be noticed that one of the most important characters on which the species is separated is the colour of the epipleuræ or reflexed margins of the elytra; care must, however, be taken to see that the specimens examined are mature, and they should be turned upon their backs and looked at from above; if viewed sideways when mounted on card the reflection from the card and the red legs is quite sufficient to cause the shining bronze margins of the *marinus* group to appear reddish; in immature specimens also they have a reddish tint, but this is quite different from the clear red colour of the *nator* group.

I. Under surface entirely red.

- i. Scutellum with a small keel-like projection; elytra unicolorous; length 4 mm. G. MINUTUS, F.
- ii. Scutellum without projection; punctures of elytra usually situated on more or less distinct metallic lines; length 6-7 mm. G. URINATOR, Ill.

II. Under surface either entirely dark, or (in some varieties) partially red.

i. Reflexed margins of elytra red.

1. Form elongate more or less parallel-sided; length $5-7\frac{1}{2}$ mm.
 A. Apex of elytra transversely truncate with the external angle sharply marked; length $5-6\frac{1}{2}$ mm. G. ELONGATUS, Aubé
 (*distinctus*, Sharp).
- B. Apex of elytra truncate in a curve with the external angle not marked; length $6-7\frac{1}{2}$ mm. G. BICOLOR, Payk.

2. Form oval; length 5-6 mm.

- A. Interstices of elytra and upper surface of head and thorax covered with fine punctures or striæ G. CASPIUS, Mén.
 (v. *colymbus*, Sharp's Cat.).
- B. Interstices of elytra smooth; punctures and margins more or less brassy G. NATATOR, Scop.

- ii. Reflexed margins of elytra pitchy red; punctures not brassy; interstices of elytra smooth; length $4\frac{1}{2}$ mm. G. SUFFRIANI, Scriba.
- iii. Reflexed margins of elytra bronze; interstices of elytra finely punctured.

1. Elytral rows of punctures scarcely finer towards suture G. MARINUS, Gyll.
2. Elytral rows of punctures much finer towards suture G. MARINUS, v. *opacus*, Sahl.

G. minutus, F. The smallest and one of the most distinct of the British species: oblong-ovate, rather convex, of a bluish-black colour with the sides of the body and front of the head usually metallic; upper surface densely and finely coriaceous, so that the insect appears rather dull; scutellum with a well-marked carina at base which at once distinguishes the species; elytra strongly and equally punctate-striate, the outer striae a little more marked than the inner ones, underside including the inflexed margin of the elytra entirely reddish: sometimes the basal segments of the abdomen are a little clouded with a darker colour. Long. $3\frac{1}{2}$ – $4\frac{1}{2}$, lat. 2 – $2\frac{1}{2}$ mm.

Local and rare in England and Wales; formerly recorded from Swansea; Barmouth (Blatch); Northumberland, not common (Bold); Scotland, local but sometimes abundant where it occurs, and widely distributed in both Lowlands and Highlands in the Tweed, Forth, Solway, Clyde, Tay, Dee and Moray districts, and probably further north. Ireland near Belfast, and abundant locally in Donegal.

G. urinator, Ill. (*lineatus*, Steph.). Much larger than the preceding, ovate, broad, and shining; head with the front part brassy and dull, the vertex black and shining; thorax shining with margins metallic, with a long transverse impressed line across centre of disc, and besides this a shorter one on each side; elytra finely punctate-striate, the punctures being almost obliterated except at sides and apex, shining black, brassy at sides and suture, and more or less distinctly along the course of the striae; under surface including the inflexed margins of the elytra reddish testaceous. Long. 6–7, lat. $3\frac{1}{3}$ – $3\frac{2}{3}$ mm.

Very local; recorded by Stephens from Slapton Ley near Dartmouth, but this appears to have been in error, as it has not occurred there since, although, as being a south European species, we might expect to find it in the south of England rather than in the north; the only locality appears to be the Duabon (Ouseburn) near Newcastle-on-Tyne, where Mr. Bold has taken it in some numbers; I have a record from Strathglass, Scotland, but, as I have not seen the specimens, I cannot be certain of this locality.*

G. elongatus, Aubé (*distinctus*, Sharp). Oblong-ovate, more or less parallel-sided, upper side bluish black, shining, the sides brassy; elytra punctate-striate, all the rows of punctures well marked, the inner however being somewhat finer than the outer especially towards the base; apex of elytra sharply truncate with the external angle well marked; legs and reflexed margins of elytra always, and mesosternum and extremity of abdomen usually, red. Long. 5– $6\frac{1}{2}$, lat. $2\frac{1}{2}$ – $3\frac{1}{4}$ mm.

Local but not uncommon in many parts of the country in both fresh and brackish water; Deal; Gravesend; Whitstable; Harwich; Brighton; Bournemouth; Weymouth; Bournemouth; near Ramsgate; Wicken Fen; Norfolk; Suffolk; Devonshire; Cannock Chase; Northumberland; Scotland, scarce, Forth and Clyde districts.

* Since writing the above I have heard from Mr. Gillo of Bath that he has taken this species abundantly in the neighbourhood of that town.

G. bicolor, Payk. Very like the preceding but more elongate, and on an average larger, with the sides more parallel, and the elytra longer with their apices more rounded, so that the external angle is not marked; according to M. Bedel the mesosternum is always black in this species and red in *G. distinctus*, but this appears to be a variable character, and cannot be relied on. Long. $6-7\frac{1}{2}$, lat. $2\frac{1}{2}-3\frac{1}{3}$ mm.

Rare; most of the specimens standing under this name in our collections belong to the preceding species; it has been taken in Durham, and also at Horning Fen; it has also been recorded from Swansea, Exmouth, Weymouth, Gravesend and Liverpool, but all these localities are doubtful; in a long series of *G. distinctus* so many variations occur that it is probable that this species may be only an extreme variety of that insect, although in itself it seems very distinct by reason of its elongate and laterally compressed form; specimens, however, of undoubted *G. distinctus* occur which present this same peculiarity of form, although as a rule that species appears to be more oval and less elongate than *G. bicolor*.

G. colymbus, Er. (*G. caspius*, Mén., 1833, Cat. rais. p. 142; Aubé, Icon. v. p. 386, pl. 44, spec. p. 679; *distinctus*, Aubé, Icon. v. p. 385, pl. 43, spec. p. 366; *colymbus*, Er., 1837, Käf. Mark. i. p. 191; *libanus*, Aubé, 1838, spec. p. 667).

As there is so much confusion over this species, and as in the latest European catalogue (Heyden-Reitter-Weise, p. 32, 1883) *G. caspius*, Mén., and *G. colymbus*, Er., are given as separate species, although included together, as in the above synonymy, by M. Régimbart in his monograph of the same date (1883), I have thought it best to give a translation of his description:—

“A very variable species, of rather long oval shape, never parallel, generally a little contracted behind; upper surface shining, black, with bluish, or sometimes slightly greenish reflections, broadly and strongly bronzed on the sides; underside black, with the mesosternum and the anal segment obscurely ferruginous, often almost black. Elytra covered with a rather fine punctuation, sometimes thick and rather strongly impressed, sometimes more diffuse and obsolete; sometimes even the points take the form of very short transverse striolæ; these variations in the punctuation are independent of sex and locality. The truncation of the apex of elytra is a little oblique and slightly rounded, with the external angle obtuse and more or less rounded, and the internal almost a right angle narrowly rounded; the punctures of the series on the elytra are rather dull, rarely of a moderate size, set somewhat widely apart, and rather stronger externally; the border is narrow and terminated a little behind the external angle.” Long. $5\frac{3}{4}-7$, lat. 3–4 mm.

The descriptions of *G. colymbus* and *G. caspius* as given by most authors in many points so closely resemble one another that it is no wonder that a confusion has arisen; there seem, however, to be three forms, one with the interstices smooth, the second with the interstices plainly punctured if magnified, and the third with the interstices covered with distinct and rather strong transverse striae. Aubé distinctly says of his *caspius* that it has the interstices smooth, and Kiesenwetter (Insect.

Deutsch. Dytiscidae, &c., p. 140) makes no mention of any punctuation of the interstices of *G. caspius*, whereas (p. 141) he expressly says of *G. colymbus* that the interstices in both sexes are very finely, but under a strong magnifying power distinctly punctured. I have before me a specimen of Dr. Sharp's from Stony Stratford labelled *Gyrinus colymbus* *jibe* Régimbart = *caspius* *mili*: as the interstices are evidently, although very finely, punctured, this is probably the true *G. colymbus*, Er.: there remains, however, the third form with the interstices covered with distinct striae: as will be seen by the description above, M. Régimbart considers this a mere variety of *caspius*; Dr. Sharp in his last catalogue gives it as *v. colymbus*, Shp., of *colymbus*, Er., and considers *caspius* as synonymous with *colymbus*. The striolate form appears, however, to be very distinct, in fact considerably more distinct than several other of the species; I propose therefore to name it *G. striolatus*; the following is the description:—

Ovate, not very convex, above bluish black, slightly shining, the elytra punctate-striate, the internal striae rather finer than the outer; the interstices of elytra and the upper surface of head and thorax are closely covered with short transverse striae, which are very distinct; underside black, margins of thorax and elytra and legs (including the claws), breast, and extremity of abdomen rufo testaceous. Long. 6-7, lat. $3\frac{1}{3}$ -4 mm.

The insect in size and form resembles *G. marinus*, but is distinguished from that species by the red reflexed margins of elytra, red claws, and peculiar sculpture.

Six specimens originally in Mr. Crotch's collection, locality unknown.

If any weight at all is to be allowed to sculpture, I feel convinced that this species must be allowed to stand; if, however, it should still be regarded as a variety, I think that the variety requires a distinct name.

It seems doubtful whether the type *caspius* form is found in Britain.

G. natator, Scop. Ovate, convex, upper side bluish-black with the sides brassy; elytra punctate-striate, the internal striae much fainter than the external; under side black, with the margins of the elytra and the legs red, or reddish testaceous; sometimes the breast and apex of abdomen are red (var. *substriatus*, Steph.). Long. 5-6 $\frac{1}{2}$, lat. 2 $\frac{2}{3}$ -3 $\frac{1}{2}$ mm.

Of this species there are two well-marked forms, which have been regarded by some authors as distinct; they are, however, connected by intermediate forms possessing characters of each; they may be described as follows:—

1. *G. nerypus*, Ahr. Broad, not so much narrowed before and behind, the inner striae evidently finer than the outer, especially towards the suture, but always distinct and perceptible for their whole length.

Very common in England especially in the south, but does not occur in Scotland.

2. *G. natator*. Narrower, the sides more rounded, and the internal striae very obsolete or entirely wanting towards the base of the elytra.

Common in Scotland, but rarer further south (Cambridge, &c.) ; at Deal a form occurs with the form of *natator* and the punctuation of *mergus*.

Dark dull forms of the species are occasionally found ; in one form or another it is one of the most abundant and common beetles throughout the kingdom.

G. Suffriani, Scriba. This species is rather closely allied to *G. natator*, but is much smaller than the average specimens of that insect, and may be distinguished by the punctured striae of the elytra not becoming finer towards suture on disc ; the reflexed margin of the elytra is pitchy and not clear red, and the punctures on the elytra are not brassy ; the apex of elytra is truncate almost in a straight line ; according to M. Bedel *G. natator* has the apex of elytra not raised and marked with a series of punctures placed transversely, whereas in *G. Suffriani* this series is obsolete and the apex is raised ; this does not, however, appear to be a constant or reliable character. Long. $4\frac{1}{2}$ –5, lat. 3 mm.

Rare ; Horning Fen, Norfolk ; Wicken Fen ; Sandwich ; Scotland, Dumfries.

G. marinus, Gyll. Ovate, not very convex, upper side bluish black, shining, the sides brassy, the elytra strongly punctate-striate, the internal striae being almost uniform in strength with the outer ; punctures deep especially towards apex, where the interstices are somewhat convex ; underside, including reflexed margins of elytra, brassy black ; legs (except claws) red ; male shining with interstices obsoletely punctured, female rather dull with interstices thickly punctured. Long. 5–7, lat. $2\frac{2}{3}$ – $3\frac{1}{3}$ mm.

Local but rather common in England both near the coast, in brackish water, and inland, and widely distributed from Northumberland to Devonshire ; it is found in the midland districts ; in Scotland the variety only occurs ; Ireland, near Belfast and Dublin, and probably common.

V. opavus, Sahl. This variety, which by some authors is considered distinct, differs from the type in being on the average considerably smaller, and in having the striae on the elytra finer, especially the inner ones : a form occurs in which the upper surface is altogether dull and opaque. Long. $4\frac{2}{3}$ –6, lat. $2\frac{1}{2}$ –3 mm.

Local in England ; Tottenham ; West Drayton ; Woking ; Bishops Wood ; Horning Fen ; Stony Stratford ; Beverley ; Northumberland ; it is not found, apparently, in the south. Scotland, common in both Lowlands and Highlands, Forth, Tay, Dee, Solway, and Clyde districts. The dull variety resembles *G. minutus*, in company with which Dr. Sharp found it at Invercarnich, Inverness-shire.

ORECTOCHILUS, Lacordaire

This genus contains about thirty-five species, which are chiefly found in the East Indies and Africa ; they are, as a rule, nocturnal in their

habits, but not universally; they are always found on clear or running water; one species only is European.

The larva of *O. villosus* is figured by Schödté (ii., Pl. vii., Fig. 1): it very closely resembles that of *Gyrinus marianus* described above; it is, however, a little stouter, and the segments are somewhat differently shaped, being not so much narrowed behind; the ciliated appendages attached to the sides of the segments are considerably shorter and rather broader; the legs are somewhat longer and the claws stouter; the prothoracic scutum is broader and more darkly coloured, and the head is more oblong with the ocelli less prominent.

O. villosus, Müller. Oblong, rather narrow, very convex, rather shining, of a fuscous colour, the upper surface covered with fine yellowish-gray pubescence, and irregularly punctured; underside pitch-black; extreme margins of sides, under surface of body including reflexed margins of elytra, and legs, reddish testaceous. Long. $5\frac{1}{2}$ -6, lat. $2\frac{2}{3}$ mm.

Local but widely distributed and not uncommon: it conceals itself under the banks or in half-submerged logs, &c., by day, and comes out at night; Dr. Sharp says that he has seen it gyrating by moonlight on Loch Ken in Galloway. London district, Lewisham, Red Hill, &c.; Norfolk; Wicken Fen; Dartmoor; Swansea; Midland districts, common, Bewdley, Tewkesbury, Alcester, river Dove near Burton-on-Trent, &c.; Yorkshire; Northumberland and Durham district. Scotland, local, Lowlands, Tweed, Forth, Solway, Clyde. Ireland, near Dublin.

CLAVICORNIA.

This division, which includes a large number of families, must be considered as more or less artificial, and as adopted for the sake of convenience, rather than as being scientifically accurate: as Dr. Horn observes (Classif. Col. North America, p. xxx) the Clavicorn and Serriicorn series present "so many exceptional cases that it is very hard to define their members: in the Clavicorn series the tarsal system has its feeblest value, as every possible variation exists from the pentamerous to the monomerous; as a general rule, in doubtful cases, any departure from the pentamerous tarsal structure is an indication of Clavicorn relationship." Dr. Sharp prefers to drop these large and somewhat anomalous divisions, and to retain the families only; this is perhaps more scientifically correct, but the retention of the large divisions, as long as it is remembered that they are more or less artificial, presents many points of advantage to the general student.

HYDROPHILIDÆ.

This family is made up of two distinct sub-families, the Hydrophilinae and the Spharidiinae; both these in the perfect state feed on decomposing vegetable matter, but the former is composed exclusively of water-frequenting insects, while the species belonging to the latter, although in some cases found in damp and marshy localities, are essentially land insects, and occur in heaps of decaying vegetable matter, &c.

dung of herbivorous animals, &c. ; the term *Palpicornia* is perhaps more suitable for the group than the names *Hydrophilidæ* or *Philhydrida* by which it is usually known, the chief distinguishing mark being the development of the maxillary palpi ; these in many instances are several times longer than the antennæ, which are very short in the majority of the *Hydrophilinæ* ; in the *Sphæridiinæ* the disproportion is not so marked ; as, however, the family cannot be separated from the *Clavicornia*, the term *Palpicornia* causes confusion.

It is a curious fact that the larvæ of the *Hydrophilinæ*, at all events as a general rule, are carnivorous and eminently predaceous, even devouring one another, if other animal food fails them, as I have observed in the case of the larvæ of *Spercheus* ; they form, therefore, a rather strong connecting link between the carnivorous *Coleoptera* and the purely vegetable feeders ; the *Hydrophilidæ* as a rule, with the exception of the *Helophorina* and their allies, are of an oval convex form, sometimes hemispherical, and often very shining ; the elytra are sometimes striate, sometimes possess only a sutural stria, and occasionally this too is wanting ; in the species with smooth elytra there are generally three irregular rows of punctures on each elytron as in the *Dytiscidæ* ; the palpi are four-jointed, the antennæ are made up (perhaps only apparently) of not more than from six to nine joints, and terminate, as a rule, in a three-jointed club ; the number of free ventral segments of the abdomen varies from five to seven ; the tarsi are all five-jointed (except in the genera *Hydrocombis* and *Cymbiodyta*, in which the middle and hinder tarsi are truly four-jointed), with claws furnished with a small basal tooth : the relative difference in the length of the tarsal joints affords a valuable character for the separation of the tribes ; this character, however, as used in separating the two sub-families *Hydrophilinæ* and *Sphæridiinæ* is quite untenable if applied to the exotic species ; in our limited fauna it holds good.

The *Hydrophilidæ*, as remarked by Dr. Sharp (*Biol. Cent. Am. Hydrophilidæ*, p. 53), will probably become a family of even greater extent and importance than the *Dytiscidæ* ; for the last-named family is rich in species in the more frigid portions of the earth's surface, while this is not the case with the *Hydrophilidæ*, whose species appear to be most numerous in the warmer regions, and as yet are very imperfectly known in comparison with the more northern *Dytiscidæ*.

The connection of the family with the *Dytiscidæ* is very superficial ; it bears, however, strong relations towards other families of the *Clavicornia* ; through *Hydrochus* it is connected with the *Elmides*, through *Cereyon* with *Anisotoma*, and through *Cryptopleurum* with *Abreus* and the *Histeridæ* ; in the present state of our knowledge the best position that can be assigned to it is perhaps between the *Adephaga* and the *Silphidæ*. The two sub-families may be thus distinguished :—

1. Legs provided with swimming cilia ; posterior tarsi with the first joint very short, often not visible from above *HYDROPHILINÆ*.
2. Legs not provided with cilia ; tibiæ spinose ; posterior tarsi with the first joint elongate *SPHÆRIDIINÆ*.

Sub-Fam. **HYDROPHILINÆ.**

Besides the above-mentioned characteristics, the members of this sub-family have the labrum almost always very distinct and not hidden behind the clypeus ; the larvæ are always provided with legs, which are

absent in the larvæ of the Sphæridiinae: all the species are aquatic, but, with few exceptions, they are very poor swimmers; as Mulsant observes (*Palpicornes*, p. 13), it is quite sufficient to see their motions in the water to be convinced of their pacific and non-predaceous habits. They may be divided into the following tribes:—

- I. Second joint of posterior tarsi elongate, longer than third.
 - i. Thorax at base as wide as base of elytra, smooth.
 1. Tarsi compressed; metasternum prolonged into a spine HYDROPHILINA.
 2. Tarsi not compressed; metasternum not prolonged into a spine HYDROBIANA.
 - ii. Thorax narrowed behind, narrower than elytra, furnished with distinct longitudinal furrows HELOPHORINA.
- II. Second joint of posterior tarsi short, about equal to third.
 - i. Clypeus emarginate; scutellum long, triangular; anterior coxal cavities open behind SPERCHEINA.
 - ii. Clypeus truncate; scutellum small and short; anterior coxal cavities entirely closed HYDROCHINA.

HYDROPHILINA.

The two species belonging to this tribe are by far the largest of the British Palpicornia, and the best swimmers; they belong to separate genera.

1. Prosternum plainly excavated; metasternal spine prolonged considerably beyond posterior coxæ; length 37–48 mm. HYDROPHILUS, Geoff.
2. Prosternum sharply keeled; metasternal spine hardly projecting beyond posterior coxæ; length 14–18 mm. HYDROCHARIS, Latr.

HYDROPHILUS, Geoffroy. (*Hydrous*, Leach.)

This genus comprises about forty species, which are widely distributed throughout the globe, but are chiefly found in hot climates; they are remarkable for their large size; they are usually black or olive-coloured, but some exotic species are metallic: the females construct a cocoon in which to shelter their eggs.

H. piceus, L. Oval; black or olivaceous black above with the margins of the elytra greenish; head smooth with some deeply punctured depressions; thorax smooth with a deep and deeply punctured depression on each side of middle in front; elytra with rather finely punctured striae, alternate interstices with rows of large punctures, duller in the female than the male, furnished in both sexes with a sharp spine at the sutural angle; breast clothed with yellowish pubescence, abdomen black with yellowish spots at sides; antennæ and legs black or pitchy; male with the onychium (the last joint of tarsi bearing the claws) dilated into a large triangular plate; this species, with the exception of *Laccophilus crenus*, is the largest of our indigenous Coleoptera. Long. 37–48, lat. 19–22 mm.

This species is extremely local, and appears to be almost confined to the London district and adjoining counties, and to certain portions of the fen districts; it is not

uncommon in many places near London, in stagnant water; Sheerness, Lee, Wandsworth, Croydon, Dulwich, Camberwell, Belvedere, Chelsea, Hampstead, Epping Forest, &c.; Whittlesea Mere and Yaxley Fen; Swansea; formerly recorded by Mr. Dale from Glanville's Wootton, Dorset.

The larva of this insect is figured by Westwood (Classif., vol. i., p. 121, 8, 11): when full grown it is three inches long, of a somewhat conical form, and stouter than the larvæ of the Dytiscidæ; the head is reddish brown, horny, and almost circular, with strong mandibles, the lower surface being convex and the upper flattened; the body is terminated by two short cerci, which are employed in respiration; these larvæ are very voracious, and feed on small molluscs, which they break upon their backs; they are able from the peculiar formation of their heads to twist them back so far as to allow of their thus using their backs for a table, as has been noted by Lyonnet, Mulsant, and other observers: the females, as noted above, construct a cocoon for their eggs, which hatch in from a fortnight to six weeks, and in a few hours the larvæ leave their shelter; when full grown they quit the water and form an oval cell in the adjacent bank, where they change into a thick oval pupa from which the perfect insect emerges in about forty days, the whole period occupied from the hatching of the egg being about one hundred days; Stephens says that the larva changes to a pupa beneath dung, making a deep hole for the purpose, but I have not seen this fact confirmed by other authors.

HYDROCHARIS, Latreille.

(*Hydrophilus*, Leach. *Hydrous*, Brullé.)

This genus comes very near the preceding but its members are always of a much smaller size: it comprises about twenty species, which are widely distributed over the surface of the globe (Siberia, Ceylon, Java, Brazil, &c.); like the *Hydrophili* they are found in stagnant water.

H. caraboides, L. Oblong oval, upper surface olive-black, sometimes with a greenish reflection, shining; maxillary palpi and antennæ except club reddish; thorax rather short, with two short rows of large punctures on each side of middle in front; elytra somewhat wider behind with very superficial striæ, the third and fifth interstices with regular rows of large punctures, which are less regular on the seventh, ninth, and tenth; legs blackish, the anterior pair sometimes lighter; abdomen pubescent with a small smooth shining space at apex, the segments with indistinct yellow markings on margins; male with the claws of anterior tarsi sharply bent like a grappling-hook. Long. 14–18, lat. $6\frac{1}{2}$ –8 mm.

Like the preceding, local but not uncommon in the London district, but found in very few other localities; Lee, Wandsworth, Barnes, Dulwich, Epping; Walthamstow, Essex; Askham Bog, York; Swansea; formerly recorded from Whittlesea Mere and the neighbourhood of Cambridge.

The larva of this insect is figured by Westwood (Classification, i. 121, 8, 13), and by Schiödte (i., Pl. iv., Fig. 1), who also figures the pupa (Fig. 4): the larva is slate-coloured with the scuta fuscous; the head is larger and squarer than in the larva of *Hydrophilus*, broadest in front, and narrowed behind; the scutum of the prothorax is complete, of the meso- and meta-thorax incomplete; the scuta of the dorsal abdominal segments are broken up, and on each segment take the form of four small cylindrical cornuous excrescences pointing downwards; the larva is chiefly remarkable for these and for the long ciliated appendages (something like those in *Gyrinus*) borne by the

first seven abdominal segments; the cerci are short but longer than in the larvæ of the succeeding species: it is said that this larva, when it has seized its prey, raises it by its mandibles out of the water in order to paralyze its resistance.

According to M. Dumeril the digestive canal in this and the preceding species undergoes remarkable modifications during the transformations of the insect; in the larvæ it is short and suited to their digestion as carnivorous, but in the perfect insect it becomes much elongated and adapted to their herbivorous diet.

HYDROBIINÆ.

This tribe is composed of several rather widely differing genera, some of which (e.g. *Chatarthria* and *Berosus*) might perhaps be formed into separate tribes; the species are of an oval or hemispherical form; some of them bear a superficial resemblance to those of the preceding tribe, but they are all much smaller, and none of them have the metasternum prolonged behind into a sharp spine; one exotic genus (*Amphiops*) is, as Dr. Horn points out, remarkable for having four eyes like *Gyrinus*.

Our genera may be classed as follows:—

I. First and second ventral segments not covered by plates.

i. Ventral segments five (tip of sixth sometimes visible); anterior coxal cavities open behind.

1. Last ventral segment entire; intermediate and posterior tibiæ without swimming hairs on their inner border.

A. Antennæ 9-jointed.

a. Length 4-8 mm.; maxillary palpi long.

a*. Elytra with a distinct sutural stria more or less abbreviated.

a†. Maxillary palpi with the last joint plainly longer than the penultimate

HYDROBIUS, *Leach*.

b†. Maxillary palpi with the last joint plainly shorter than the penultimate.

a‡. Base of thorax narrowly bordered; intermediate and posterior tarsi 5-jointed . . .

PHILHYDRUS, *Sol.*

b‡. Base of thorax without trace of border; intermediate and posterior tarsi 4-jointed

CYMBODYTA, *Bedel*.

c†. Maxillary palpi with the last joint about equal to the penultimate

ENOCHRUS, *Thoms.*

b*. Elytra without trace of sutural stria; last joint of antennæ plainly shorter than penultimate

HELOCHARIS, *Muls.*

b. Length not exceeding 3 mm.; maxillary palpi short.

a*. Upper surface metallic; base of thorax without trace of border

PARACYMUS, *Thoms.*

b*. Upper surface not metallic; base of thorax very narrowly bordered

ANACHINA, *Thoms.*

B. Antennæ 8-jointed

LACOBIDUS, *Er.*

2. Last ventral segment almost always emarginate; intermediate and posterior tibiæ furnished with swimming hairs on their inner border

BEROSUS, *Leach*.

- ii. Ventral segments seven; anterior coxal cavities closed behind; elytra truncate LIMNEBIUS, *Leach*.
 II. First and second ventral segments covered by two plates meeting in middle CHÆTARTHRIA, *Steph*.

HYDROBIUS, *Leach*.

The genus *Hydrobius* proper contains only a very few species, of moderate size, and of a black or slightly bronzy colour; they are found in stagnant water, and are widely distributed over Europe, Asia, and North America; in a wider sense it comprises forty or fifty species, all occurring in temperate regions and not entering the tropics.

The larva of *Hydrobius fuscipes* is figured by Schiödte (i., Pl. iv., Fig. 5): it is of a dirty-white colour with the scuta fuscous; it is broadest in the middle and much narrowed in front and behind; the head is very small with exceedingly short antennæ, the prothorax quadrate, much narrower than the following segments, with the scutum entire; the scuta of the meso- and meta-thorax are incomplete, and those of the abdominal dorsal segments are broken up and take the form of minute warty corneous plates, four on each segment; the segments themselves are much wrinkled in transverse folds; the eighth segment is very much narrowed, and bears two almost imperceptible cerci and a very small prominence at apex; the legs are very short.

The larva of *Philhydrus* and the allied species bear so close a resemblance to that of *Hydrobius* that they hardly require a separate description; that of *P. testaceus* is figured by Schiödte (i., Pl. iv., Fig. 6), and a reference to his plate will show their extreme similarity; the female beetles differ from the female of *Helochares* (the larva of which is very closely allied to that of these species) in not carrying their eggs in a sac attached to the abdomen.

1. Elytra with distinct punctured striæ, striæ deep towards apex; length 5-7½ mm. II. FUSCIPES, *L*.
 2. Elytra with fine rows of punctures, not striated; length 8-9 mm. II. OBLONGUS, *Herbst*.

H. fuscipes, *L*. Oval, convex, black or pitchy black, shining, female duller than male; thorax much broader than long, very closely, but distinctly, punctured; elytra as broad at base as base of thorax, with eleven punctured striæ on each; interstices closely punctured, the alternate ones furnished with a row of pores; legs ferruginous, femora darker at base, posterior femora pubescent almost to apex. L. 5-7½ mm.

Common and widely distributed throughout the kingdom.

H. picicrus, *Sharp*, appears to be a distinct race of this species, and may perhaps be considered distinct: it differs from the type form in being rather smaller, shorter, and more convex; the tibiæ as well as the extremity of the femora are pitchy, and the hind angles of the thorax form a more obtuse right angle; the striæ of the elytra also are more strongly punctured; it has been found in the following localities: Askham Bog, York; Liverpool; Knowle, near Birmingham; Wicken Fen; Lymington; Corstorphine Hills, Scotland, &c.

A variety very rarely occurs in which the upper surface is of a strongly metallic greenish or bluish colour.

H. oblongus, *Herbst*. (*picipes*, *Fab.*). Very like the preceding, but

larger, longer in proportion, and more often showing a metallic reflection ; it is easily distinguished by the absence of striæ on the elytra, and by the fact that the posterior femora are quite smooth. L. 8-9 mm.

Brackish ditches ; local, but not uncommon in some districts near London, and in the south and south-east of England. Gravesend, Sheerness, Whitstable, Rainham, Deal, Hastings, &c. ; Southport and Lancaster (Mr. Reston) ; according to M. Bedel this insect possesses a slight power of stridulation.

PHILHYDRUS, Solier.

This genus comprises about fifty species, which are widely distributed both in the northern and southern hemispheres, from Northern Europe and America to Ceylon, Java, Chili, and Brazil ; they are found in stagnant water, and some of the species are confined to brackish ponds and ditches.

The larvæ of this genus closely resemble those of *Helochares* ; the females, however, do not carry their egg-sac underneath the abdomen, but attach about fifteen little triangular silky packets to the *Lemma* on the surface of the water, each containing ten or a dozen eggs ; the larvæ do not leave these receptacles for two or three days after they have hatched.

Six of the seven European species are found in Britain, and may be distinguished as follows :—

- I. Thorax with more or less distinct larger punctures arranged transversely on middle of sides ; size larger.
 - i. Maxillary palpi with second joint dark *P. TESTACEUS*, *F.*
 - ii. Maxillary palpi with second joint entirely testaceous.
 1. Head testaceous, sometimes darker in middle *P. MARITIMUS*, *Thoms.*
 2. Head black, at all events as far as anterior margin of eyes.
 - A. Elytra without a trace of series of larger punctures ; last joint of maxillary palpi testaceous (at most very slightly darker at extreme apex) *P. NIGRICANS*, *Zell.*
 - B. Elytra with indistinct traces of series of larger punctures ; last joint of maxillary palpi rather broadly black at apex *P. MELANOCEPHALUS*, *Ol.*
- II. Thorax without larger punctures at sides ; size smaller.
 - i. Head without yellow spots in front of eyes ; last joint of maxillary palpi black at apex *P. MINUTUS*, *F.*
 - ii. Head with distinct yellow spots in front of eyes ; last joint of maxillary palpi entirely testaceous *P. COARCTATUS*, *Gredl.*

P. testaceus, *F.* Oblong-ovate, rather convex, upper surface finely and closely punctured, lighter or darker testaceous, head black as far as front of eyes, disc of thorax dusky ; elytra with a sutural stria reaching from apex to a little beyond middle ; legs ferruginous. L. 6-7 mm.

Ponds and ditches ; local but not uncommon ; London district generally ; Norwich ; Deal ; Hastings ; Ramsgate ; Horning Fen ; Swansea ; Devonshire ; Manchester

district; Askham Bog, York; not recorded from the extreme north of England or from Scotland.

This species is easily distinguished by the dark second joint of the maxillary palpi.

P. maritimus, Thoms. (*bicolor*, F., *grisescens*, Gyll.). Very like the preceding, but at once distinguished by the second joint of the antennæ being entirely testaceous; it is also slightly smaller and narrower, and the head and legs are of a lighter colour. L. $6-6\frac{1}{2}$ mm.

Brackish ponds and ditches; common near the coast except in the extreme north of England and in Scotland. Gravesend; Sheerness; Whitstable; Lymington; Brighton; Pegwell Bay, near Deal; Hunstanton; Southport; recorded also from Ireland.

P. nigricans, Zett. (*frontalis*, Er.). Oval, convex, smaller than the two preceding species; head entirely black, or black as far as front of eyes; thorax dark with margins more or less broadly testaceous; elytra lighter or darker testaceous; legs testaceous, femora darker; last joint of maxillary palpi entirely reddish testaceous. L. $5-5\frac{1}{2}$ mm.

Ditches, &c.; local; not common near London; Plumstead, Lee, Gravesend, Greenwich, &c.; Abbey Wood; New Forest; Pegwell Bay; Wicken Fen; Askham Bog, York; Lancaster; Northumberland; Scotland, local, Lowlands, Tay, Dee, Moray, Solway.

P. melanocephalus, Ol. (*quadripunctatus*, Herbst.). Very like the preceding, but slightly narrower, and usually of a darker colour; head, and thorax, except margins, black; elytra with traces of rows of larger punctures; last joint of maxillary palpi distinctly black at apex. L. $5-5\frac{1}{2}$ mm.

Ditches, &c.; local but not uncommon; Darenth Wood, Lee, Greenwich, Woking; Devonshire; Swansea; Lancaster; Liverpool; Rothley Lakes, Northumberland; Scotland, common, Lowlands, Highlands, as far north as the Moray district; Ireland, near Belfast and Dublin.

P. minutus, F. (*marginellus*, Thoms.). Oblong-ovate, moderately convex; upper surface closely and distinctly punctured; head black, unicolorous; thorax dark with lighter margins; elytra lighter or darker testaceous, suture and sides usually darker; legs brownish testaceous, tarsi lighter; the maxillary palpi are more or less dark, and the last joint is often entirely black. L. $3\frac{1}{2}$ mm.

Ditches, &c.; apparently not a common species, the succeeding species being far commoner, and being often confounded with it; Esher, Woking, Purfleet, Horsell; Cambridge; Manchester district; Northumberland; Scotland, local, Lowlands, Forth, Tay, Clyde, Solway.

P. coarctatus, Gredl. (*suturalis*, Sharp). This species comes very close to the preceding, but is distinguished from it by its rather larger size, testaceous palpi, and the yellow spot on the clypeus on each side in front of eye; the colour of the suture also is usually more marked; occasionally the palpi have the second and the middle of the last joint slightly clouded. L. $3\frac{3}{4}-4$ mm.

Common and widely distributed; London district; Deal; Hastings; New Forest;

Shrewsbury; Cambridgeshire Fens; Askham Bog; Sea-Land, local; Lowlands, Tay and Solway districts; probably common in Ireland.

CYMBIODYTA, Bedel.

This new genus, provisionally indicated by M. Pandellé, and afterwards established by M. Bedel, contains at present two or three species from Europe and the United States, which, according to M. Bedel, are distinguished from *Philhytrus* by the shape of the mesosternum and the absence of a border at the base of thorax; Dr. Sharp, however, has pointed out that this genus and also the genus *Hydrocombus* (which is near *Philhytrus*) differ from the other Hydrophilinae as at present known, in having the intermediate and posterior tarsi truly (and not apparently as is often the case) four-jointed; the pseudo-basal joint of the maxillary palpi is also very slightly bent in such a manner that when extended the curve of the joint is concave in front or inwardly, whereas in *Philhytrus* it is in the opposite direction.

C. ovalis, Thoms. (*marginalis*, F.). Oblong-ovate, moderately convex, a little depressed on disc, unicolorous black with the sides of thorax and elytra more or less distinctly reddish; upper surface closely and distinctly punctured; antennæ and maxillary palpi ferruginous, joints of the latter lighter at apex; legs black or pitchy black, tarsi testaceous. L. 4-4½ mm.

Rather common and widely distributed in the London district and the south of England; also occurs in the Cambridgeshire Fens; there appears, however, to be no record of its capture from further north than Askham Bog, where I have taken it not uncommonly.

ENOCHRUS, Thomson.

This genus is included by many authors under *Philhytrus*, and perhaps it would be better not to separate it from that genus; the relative length of the last joints of the maxillary palpi is the chief character by which it is distinguished.

E. bicolor, Gyll. (*melanocephalus*, Ol., *atricapillus*, Steph.). Oval or oblong-oval, convex; upper surface closely and distinctly punctured; head black with a yellow spot on each side above eyes; maxillary palpi testaceous with second joint sometimes clouded and with apex of first joint black; thorax and elytra rather brightly testaceous, the latter with more or less distinct traces of rows of larger punctures; legs and under-side black, tarsi and apex of tibiae somewhat lighter. L. 5-5½ mm.

Local; ponds, ditches, &c., both fresh and brackish; London district, not uncommon; Horning Fen; Deal; Hastings; Ramsgate; The Holt (Selborne); Findera, near Barton-on-Trent; Stretford, near Manchester; Scarborough; not recorded from the extreme north of England or from Scotland.

PARACYMUS, Thomson.

The species belonging to this and the succeeding genus have been classed

by some authors under *Hydrobius*; their very small size and short maxillary palpi will at once distinguish them superficially; it must, however, be remembered that many of the generic distinctions are purely artificial, and that in many cases it seems rather a matter of taste than of scientific accuracy whether we adopt them or not.

P. nigroæneus, Sahl. Oval, convex, dark metallic bronze or bronze-black, upper surface closely and rather strongly punctured; maxillary palpi broadly pitchy at apex; legs pitch-black. L. $2\frac{1}{4}$ – $2\frac{1}{2}$ mm.

Ponds and ditches; local and not common. Lee, Wimbledon, Esber, Woking, Horsell; New Forest; Exeter.

We do not possess the true *P. æneus*, Germ., which is rather smaller and narrower with the palpi unicolorous red, and the legs also red. Dr. Sharp also points out (E. M. Mag. xxi. 112) that the structure of the antennæ is different in the two species.

ANACÆNA, Thomson.

The species of *Anacæna* are distributed over the greater part of the Old World; they are distinguished from the preceding by the non-metallic upper surface, and by having the base of the thorax narrowly bordered.

I. Head black at most with a very small reddish spot on each side before eyes; thorax dark with side margins lighter.

1. Form broader; maxillary palpi and tarsi stouter

A. GLOBULUS, Payk. (*limbata*, Sharp).

2. Form narrower; maxillary palpi and tarsi more slender

A. LIMBATA, F. (*variabilis*, Sharp).

II. Head with a large testaceous marking on each side before eyes; thorax testaceous with centre of disc darker

A. BIPUSTULATA, Steph.

A. globulus, Payk. (*limbata*, Sharp). Oval, almost hemispherical, very convex, shining, upper surface distinctly punctured; head black; thorax black with margins lighter; elytra fuscous or fuscous-black with margins and apex lighter; legs reddish or pitchy. L. $2\frac{1}{2}$ –3 mm.

Ponds and ditches; common and widely distributed in England and Scotland.

A. limbata, F. (*variabilis*, Sharp). Very like the preceding but narrower and more elongate; the mesosternum is raised behind in the middle in a pointed projection, which is wanting in the preceding species; the maxillary palpi are not so thick, and the tarsi are more slender; the colour of the elytra is, as a rule, but not always, lighter; the head is usually entirely black, but a variety occurs in which there is a small rufo-testaceous spot on each side before the eyes. L. 2– $2\frac{1}{2}$ mm.

Ponds and ditches; common and widely distributed in England, but local in Scotland, and only recorded from the Forth, Tay, and Solway districts.

A. bipustulata, Steph. Smaller than the two preceding species;

head dark with a large testaceous mark on each side in front of eyes; thorax testaceous with the disc more or less broadly dark; elytra testaceous with indistinct dark markings; legs testaceous; in form it is more widely oval than *A. limbata*. L. $1\frac{3}{4}$ – $2\frac{1}{4}$ mm.

Ponds and ditches; local, and as a rule not common; London district, rather frequent, Lee, Wimbledon, Woking, &c.; Steney Stratford; Southsea; Deal; not recorded from the north of England or from Scotland.

HELOCHARES, Mulsant.

This genus comprises a moderate number of species, two or three of which are found in Europe; they are distinguished by the fact that the elytra have no trace of a sutural stria, and that the last joint of the antennæ is plainly shorter than the penultimate.

The larva of *H. lividus* is fully described and figured by Cussac (Ann. Fr. 1852, p. 624, Pl. 13); it very closely resembles that of *Philhytrus*; the female beetle, unlike those belonging to the allied genera, carries her eggs in a little bag attached to the abdomen; according to Mulsant she becomes more unwilling to abandon her eggs, if disturbed, as the time of hatching approaches, although at first she will let them go at the approach of danger; the insect appears either to attach the egg-bag to an aquatic plant shortly before hatching, or, if there is none at hand, to turn itself on its back at the surface of the water, and there remain until the young larvæ have emerged.

Two species are found in Britain, the second of which is considered by many authors to be only a race or variety.

1. Punctuation fine; last joint of maxillary palpi unicolorous or slightly dusky at extreme apex only *H. LIVIDUS*, Forst.
2. Punctuation coarser; last joint of maxillary palpi distinctly and rather broadly black at apex *H. PUNCTATUS*, Sharp.

H. lividus, Forst. Oblong-oval, rather elongate, not very convex; upper surface entirely testaceous, finely punctured; maxillary palpi very long; thorax with anterior margin almost truncate, base not margined; elytra rather wider behind, without sutural stria, with traces of rows of larger punctures; underside pitchy, legs testaceous, femora darker and strongly pubescent; claws toothed at base. L. 5–6 mm.

Ponds, ditches, &c., both inland and near the coast; local, but rather common and widely distributed as far north as Askham Bog, and Preston Marshes, Lancashire; it does not, however, occur in the extreme north of England or in Scotland, as far as is at present known.

H. punctatus, Sharp. Very like the preceding but more strongly punctured, with the apex of the last joint of maxillary palpi rather broadly black, and with stronger traces of larger punctures on the elytra; the general colour is darker, and the head is often almost black; the legs also are much redder. L. 5–6 mm.

Ponds, ditches, &c.; local; common in the London district generally, and also in the New Forest; Repton, Burton-on-Trent; Lancaster; in all probability widely distributed throughout the midland and southern districts; in Scotland it is very local,

being only found in the Tay district, where it has occurred rather commonly in a pond on Moucreiffe Hill, Perth.

According to M. Bedel this species at first sight seems very distinct, but, as all the intervening links occur, he considers it to be only an extreme variety of *H. lividus*, which he regards as an essentially variable species.

LACCOBIUS, Erichson.

This genus comprises about fifteen species chiefly from Europe, but one or two occur in North America and Africa: they are small insects, and are found in both fresh and brackish water either stagnant or running; they often occur in abundance in very small puddles; if the bottom is disturbed they rise to the surface; the males have the second and third joints of the anterior tarsi dilated. Until quite lately two species only have been considered to be British, but Dr. Sharp, following M. Bedel, has discovered that we possess four; the distinctions are very plain, but for their satisfactory recognition they require a high magnifying power.

I. Interspaces of thorax quite smooth between punctures.

1. Punctuation of elytra confused **L. SINUATUS**, Mots.
2. Punctuation of elytra in regular rows **L. BIPUNCTATUS**, F.

II. Interspaces of thorax alutaceous between punctures.

1. Punctuation of elytra confused **L. ALUTACEUS**, Thoms.
2. Punctuation of elytra in regular rows **L. MINUTUS**, L.

L. sinuatus, Mots. (*nigriceps*, Thoms.). Oval, very convex; head black; thorax black with sides broadly yellow; elytra greyish-testaceous with traces of darker markings, and with sides lighter; legs and maxillary palpi testaceous; second joint of posterior tarsi almost twice as long as third; the colour is somewhat variable; a variety occurs in which the clypeus is bordered with yellow on the sides (var. *maculiceps*, Rott.). L. $3\frac{1}{2}$ –4 mm.

The largest and commonest species of the genus; widely distributed throughout the kingdom.

L. alutaceus, Thoms. Slightly smaller than the preceding; at once distinguished by the sculpture of the thorax; in other points it very closely resembles *L. sinuatus*, with which it has long been mixed in our collections. L. $3\frac{1}{2}$ mm.

Dr. Sharp considers this the rarest of our four species, but it is widely distributed; London district generally; Deal; Southend; Ramsgate; Bognor; Lymington; Knowle, near Birmingham; Shrewsbury; Wicken Fen; Gumley, Market Harborough; Hunstanton; Hartlepool; Liverpool; Scotland, Edinburgh and Aberlady.

L. minutus, L. Considerably smaller than the two preceding; easily distinguished by the alutaceous ground of thorax and the regular rows of punctures on elytra; apex of elytra without pallid spot. L. $2\frac{1}{2}$ –3 mm.

Apparently not common; Cambridgeshire and Norfolk Fens; Needwood Forest,

near Burton-on-Trent; Hunstanton; Liverpool district; Holy Island; Rothley Lakes, Northumberland; Scotland, Thornhill (abundant), Loch Gelly, &c.

L. bipunctatus, F. Very like the preceding, but distinguished from it by the smooth ground of thorax, and also by having almost always a pale spot near the apex of each elytron; the second joint of the posterior tarsi is one and a half times as long as the third. L. $2\frac{1}{2}$ -3 mm.

Rather local, but often abundant; Gravesend; Folkestone; Deal; Hunstanton; Hartlepool; Horning Fen; Stony Stratford; Repton; Liverpool district; Scotland, Edinburgh.

ÆROSUS, Leach.

This genus comprises about fifty species, which are widely distributed over the surface of the globe in both the northern and southern hemispheres; they differ very widely from all the other Hydrophilidæ, the whole elytra being plainly striated; the head and disc of thorax are usually metallic; they live in stagnant water, and are much better swimmers than the majority of the members of the family; they appear to feed upon decaying water plants, but are sometimes carnivorous; by the movement of their abdomen they are able to produce a rather strong stridulation.

The larva is described and figured by Schödlte (i., Pl. v., Fig. 9): in general shape it somewhat resembles that of *Philhydrus*, except that it is much wider and more ovate; the head and prothorax are very small, the scutum of the latter being complete; the scutum of the mesothorax is small, and those of the remaining segments are broken up into very minute corneous plates, four on each segment, invisible except highly magnified; the first seven abdominal segments bear very long branchial appendages, the front ones shorter than the hinder ones, which are nearly as long as the whole abdomen; the eighth segment is short and cylindrical, and bears no cerci; the legs are rather long, and terminate, like those of the larvæ of the majority of the Hydrophilinæ, in simple claws; the colour is dull white, with blackish dots.

- I. Apex of each elytron furnished with a spine; head almost entirely testaceous (*Enoplurus*, Hope) **B. spinosus**, Stev.
- II. Apex of elytra simple; head entirely metallic.
 - i. Thorax with diffuse punctuation; male with the second joint of anterior tarsi short **B. signaticollis**, Charp.
 - ii. Thorax with very close punctuation; male with the second joint of anterior tarsi elongate.
 1. Striae of elytra broad and deep, with large strong punctures; interstices convex **B. luridus**, L.
 2. Striae of elytra fine and shallow, closely and not strongly punctured; interstices flat **B. affinis**, Brullé.

B. spinosus, Stev. Oblong-oval, very convex, testaceous or reddish testaceous, with a greenish tinge when alive; head entirely or almost entirely testaceous, more coarsely punctured than thorax; elytra rather wider than thorax, with rather deep punctured striae, interstices with irregular rows of rather large punctures, all the punctures being, as a rule, dark; there are two dark spots, often obsolete, on thorax, and some indistinct dark patches on elytra; underside brown; legs testaceous;

the species is easily distinguished by the very distinct spines at the apex of elytra. L. $4\frac{1}{2}$ –6 mm.

Local; brackish ponds and ditches; Sheerness; Sheppy; Southsea; Harwich; Rye; Brighton; Eastbourne; Seaford; Lynnington Salterns; Hunstanton; Scarborough; not found in the north of England or in Scotland.

This species is variable as regards size; in Dr. Power's collection there are two or three very small specimens.

B. signaticollis, Sharp (*ariceps*, Curt.). Oval, very convex; head bronze-green or coppery, iridescent, closely and strongly punctured; thorax brownish-testaceous with a large dark band in middle, rather diffusely punctured, with an impunctate central line which is obscurely testaceous and separates the dark band indistinctly into two parts; elytra considerably broader than thorax, with rather strong punctured striae, interstices punctured, dark brown with punctures darker; legs ferruginous, femora darker in middle; underside black. L. 5 – $5\frac{1}{2}$ mm.

Ponds and ditches inland and near the coast; local, but not uncommon; Wimbledon, Esher, Woking, Lee, Wandsworth, Earlswood, Whitstable; Cambridgeshire Fens; Devonshire; Swansea; Askham Bog; not recorded from the north of England or from Scotland.

B. luridus, L. Smaller than the preceding, with the punctuation of thorax closer and stronger, and the dark band more plainly marked and sometimes covering the greater part of the disc; the testaceous margins are lighter and more clearly defined; the striae of the elytra are stronger and more coarsely punctured, and the legs are of a somewhat lighter colour. L. 4 – $4\frac{1}{2}$ mm.

Ponds and ditches; local; Esher, Lee, Lewisham, Earlswood, and other places in the London district; Deal; Hastings; Cambridge; Scotland, rare, Solway and Moray districts.

B. affinis, Brullé. In size and shape this species rather closely resembles the preceding, but differs in not having the dark patch on thorax separated by a narrow obscurely testaceous line, and by the narrow and finely punctured striae of elytra and flat interstices. L. $3\frac{1}{2}$ – $4\frac{1}{2}$ mm.

Local, but sometimes abundant where it occurs; ponds and ditches inland and near the coast; Plumstead, Lee, Gravesend, Sheerness, Rainham; Lynnington Salterns, very common; Hastings; Devonshire; Swansea; Liverpool district.

LIMNEBIUS, Leach.

The *Limnebi* are small insects very much resembling in miniature the large *Hydrophilus piceus*; the elytra are truncate or almost truncate at apex, and the last two segments of the abdomen are furnished with hairs; they live in stagnant or slowly moving water, attached to aquatic plants; they are very poor swimmers; according to Miger the larva is terrestrial, and is carnivorous like so many other of the *Hydrophilidæ*; the males are usually smaller than the females, and differ from them in

various characters affecting the palpi, femora, or tibiæ; they also have the thorax somewhat more rounded at the sides: about twenty species are known, which are found chiefly in Europe and North America; four of these are British, and, except by their size, it is rather hard to determine them; the minuter species of Linnebius bear rather a striking resemblance superficially to the Trichopterygian genus *Hydroscapha*.

I. Length $1\frac{2}{3}$ – $2\frac{1}{2}$ mm.

1. Labrum emarginate *L. TRUNCATELLUS*, Thoms.

2. Labrum entire *L. PAPPOSUS*, Muls.

II. Length not exceeding $1\frac{1}{2}$ mm. *L. NITIDUS*, Marsh.

III. Length $\frac{1}{2}$ mm. *L. PICINUS*, Marsh.

L. truncatellus, Thoms. (*marginolis*, Steph. ♀?). Oblong-oval, convex, shining, black or brownish black with the thorax and elytra lighter at sides; head and thorax distinctly punctured; elytra alutaceous with plain punctuation; legs brownish testaceous with dark femora; male with the last abdominal segment furnished at apex with a blunt channelled projection, and with the intermediate tibiæ arcuate, and the posterior tibiæ very strongly narrowed at apex. L. $1\frac{2}{3}$ – $2\frac{1}{2}$ mm.

Common and widely distributed throughout England and Wales; Scotland, common, Lowlands, as far north as the Moray district; Ireland, near Belfast, Dublin, and Waterford, and probably common.

L. papposus, Muls. Very like the preceding in size and general appearance; upper side brown or brownish yellow with the head and disc of thorax blackish; head finely punctured, thorax rather obsoletely punctured; elytra alutaceous with distinct punctuation; legs lighter or darker testaceous; male with the penultimate joint of the maxillary palpi thickened, and with a fan-like tuft of hairs at the extremity of the last abdominal segment. L. $1\frac{2}{3}$ –2 mm.

Rather common and widely distributed from the Midlands downwards, but I can find no record from further north than Repton, Burton-on-Trent, and it has not been taken in Scotland. Ireland, near Belfast.

L. nitidus, Marsh. Considerably smaller than the preceding, shining black, with the sides of thorax and elytra obscurely reddish, very scantily pubescent; elytra alutaceous, rather obsoletely punctured, with a narrow side margin which is not continued to apex; legs darker or lighter testaceous. L. $1\frac{1}{2}$ mm.

Local but not uncommon; ditches, &c.; Earlswood, Lewisham; Cambridgeshire Fens; Horning Fen; Ramsgate; New Forest; Swansea; Birmingham district; The Wansbeck, Wallington, and Rothley Lakes, Northumberland; Scotland, rare, Lowlands, Tweed and Forth districts. Ireland, near Belfast and Waterford.

L. picinus, Marsh (*atomus*, Duft., *minutissimus*, Germ.). This species is easily distinguished by its very minute size, and by having the suture of the elytra finely bordered behind; the elytra, which are plainly alutaceous, are impunctate or very obsoletely punctate, much more so than in *nitidus*; the colour is usually black or brown black, but is

sometimes lighter; the last ventral segment of the abdomen is furnished with two long hairs which often meet together; legs lighter or darker testaceous, femora darker; male with the first joint of anterior tarsi dilated. L. $\frac{1}{3}$ mm.

Very local; ponds and ditches; exceedingly abundant in Askham Bog, York, and I have also taken it at Stamford Bridge; Knowle, near Birmingham; Hunstanton; Lancaster.

Pale varieties of some of these species are occasionally found, in which the upper surface is entirely or almost entirely testaceous with the head darker.

CHIETARTHRIA, Stephens.

This genus comprises about half-a-dozen species, which are found in Europe, the Canary Islands, and North America; they are small and very convex insects, resembling small examples of *Agathidium*; our single species is found in damp moss at the edges of ponds or streams; the genus is remarkable for the plates that cover the first two ventral segments of the abdomen.

C. seminulum, Herbst. Very convex, almost hemispherical, shining black; head smooth, antennæ and palpi red; thorax with the sides margined, smooth; elytra as broad as thorax, margined, feebly punctured, with a sutural stria, and a feeble stria on external border; underside reddish brown. L. 1-1 $\frac{1}{2}$ mm.

Rather local but not uncommon; London district; Wicken Fen; New Forest; Gurney, Market Harborough; Cannock Chase; Repton; Askham Bog; Liverpool; Northumberland; Scotland, local, in damp mosses, Tweed, Solway, Tay, and Moray districts.

SPERCHEINA.

The *Spercheina* are distinguished from all the other *Hydrophilidæ* by their emarginate clypeus and long triangular scutellum, and also by their general contour; their legs are not adapted for swimming, and they progress slowly along the surface of the water with their back downwards; one genus only, *Spercheus*, is included in the tribe: the American genus, *Sperchopsis*, Leconte, forms a portion of *Hydrobius*, and has no connection with *Spercheus*.

SPERCHEUS, Kugelann.

This genus comprises about half-a-dozen species, which are found in Europe, Egypt, Senegal, Java, and New Caledonia; besides the characters mentioned above, they are remarkable for the form of the external lobe of the maxillæ, which is long, palpiform, and subulate, and by some of the old entomologists has been mistaken for a true palpus; the antennæ are apparently six-jointed, the last five joints forming an irregular club; one species only is found in Europe, *S. emarginatus*: the larva of

this species is described and figured by Cussac, Ann. Fr. 1852, p. 617, Pl. xiii., Fig. 8-15; the young larva and its habits are also described by myself (with figures by Rev. A. Matthews) in Ent. Monthly Mag. xix. 79; the female carries her eggs in a bag attached to the abdomen until they are hatched; she is able to produce several batches of eggs in succession without the intervention of the male, as observed by M. Cussac; the full-grown larva is remarkable for its large head and very powerful mandibles, pear-shaped mentum, and the peculiar shape of its body, which is widest in the middle, and thence contracted both ways so that it appears diamond-shaped; the segments are furnished on each side with a large tuft of hairs; the legs are rather long; the larvæ are carnivorous, and in confinement prey upon one another; they walk upon the surface of the water back downwards, like the perfect insect; the perfect insect has the power of producing rather a strong stridulatory noise.

S. emarginatus, Schall. Oval, very convex, of a dirty testaceous brown colour with the head, except front which is obscurely reddish, and the thorax, except margins, dark; the elytra also are furnished with distinct dark markings at suture, and more obscure ones at sides; head and thorax coarsely and irregularly punctured, the former large, raised at the sides, the latter short, twice as broad as long; elytra rather strongly punctured in somewhat irregular rows, completely covering abdomen, with indistinct traces of raised lines; legs lighter or darker brown or pitchy. L. $5\frac{1}{2}$ –7 mm.

Until quite recently this has been considered one of the rarest British insects; Stephens records it from Windsor, York, Kensington Gardens, and Yaxley Fen, but only two or three British specimens were extant in collections, until in 1878 Mr. Billups found it in a ditch adjoining some marshy ground at West Ham, Essex; in this place he subsequently took a considerable number of specimens; the locality, however, has since been destroyed by a railway; the insect appears to live at the roots of aquatic plants in the muddiest and dirtiest ditches, and probably escapes notice owing to its retired habits.

HELOPHORINA.

This tribe, as here constituted, comprises the single genus *Helophorus*; by some authors the genus *Oellobius* with its allies *Hydrochus* and *Hydraena* are included in it, but these may be distinguished by the short second joint of the posterior tarsi and the sculpture of the thorax, as well as by their very different form.

HELOPHORUS, Fabricius.

The species belonging to this genus have a very distinct appearance; the body is oblong and rather depressed, and the surface of the thorax is furnished with broad longitudinal furrows; the colour is usually dirty brown, or testaceous, sometimes dark bronze, the head and thorax being in some species strongly iridescent; the head is sunk in the thorax, the anterior angles of which are projecting; the nine-jointed antennæ are

terminated by a perfoliate club, and the legs are rather long and slender; the under surface of the body is covered with a silky pubescence: the *Helophori* cannot swim, but proceed along the surface of the water by awkward movements of their legs; in summer they often bury themselves in the mud, but they are able to fly from one place to another if they choose, when the pools they inhabit are dried up; they are, however, often found at some distance from any water, in moss or under damp leaves, or even by sweeping herbage.

The larva of *Helophorus aquaticus* (*grandis*, Ill.) is figured by Schiölte (i., Pl. vii., Fig. 5): it is pale with the corneous parts fuscous; the head is small, much narrower than the prothorax which is trapezoidal, slightly narrowed in front, and twice as long as the meso- and meta-thorax; the scuta of the three thoracic segments are entire, and cover the whole surface, and are deeply channelled longitudinally in the middle; the abdominal segments are nine in number, the first eight of equal breadth; each of these eight segments is protected by four corneous plates arranged transversely, the middle pair being the largest; these are really formed by the breaking up of the single scuta, and correspond to the minute plates on the abdominal segments of *Hydrobius*, *Berosus*, &c., that have been before referred to; the ninth segment bears one large plate; from each side of the segments and from each portion of the scuta proceed single long setæ; the cerci are long and jointed, and each of them bears five or six long setæ; the legs are very short, and terminate in simple claws.

The genus comprises about sixty species, which are almost entirely found in Europe and North America; a few species, however, occur in Northern Africa, Madeira, and the Canaries; it is a great matter of doubt how many species we really possess as British; if we admit all the described species the number will amount to eighteen, but five or six at least of these appear to be varieties or races, so that the total number does not actually exceed twelve: there is hardly any other genus that is involved in such confusion and causes so much difficulty to Coleopterists; in determining the exotic species the same difficulty is also found; there are, however, several well-marked groups and forms that are very easy to determine; in some, however, the synonymy is in a state of hopeless confusion; the student who wishes fully to study the genus may consult with advantage the revision of the species by Thomson (Skand. Col. x. 297); Bedel has done more than any other Coleopterist of late years towards unravelling some of the difficulties.

- | | |
|---|--------------------------------|
| I. Alternate interstices of elytra tuberculate; colour shining black with æneous reflection on elytra, thorax somewhat iridescent | II. TUBERCULATUS, <i>Gyll.</i> |
| II. Alternate interstices of elytra strongly raised in ridges; colour brown; thorax not metallic. | |
| i. Humeral angle of elytra projecting; ridges of thorax irregular, sometimes raised in small knobs; length 5-5½ mm. | H. RUGOSUS, <i>Ol.</i> |
| ii. Humeral angle of elytra blunt; ridges of thorax simply convex, not interrupted; length 3-3½ mm. | H. NUBILUS, <i>F.</i> |
| III. Alternate interstices of elytra plainly, but not strongly, raised in ridges; thorax metallic; colour brown | H. INTERMEDIUS, <i>Muls.</i> |
| IV. Alternate interstices of elytra not or very slightly raised in ridges; thorax metallic. | |

- i. Base of elytra with a series of punctures between the 1st and 2nd striae **H. AQUATICUS, L.**
- ii. Base of elytra without series of punctures between the 1st and 2nd striae.
 - 1. Frontal furrows in the form of a **V** or **Y** without lateral appendages from the extremities of the arms; interstices of thorax more or less granulate.
 - A. Last joint of maxillary palpi elongate; penultimate twice as long as broad.
 - a. Elytra usually dark brown or bronze with a metallic tinge; darker markings behind middle of elytra, as a rule, scarcely visible.
 - a*. Thorax narrower than elytra; inner thoracic furrows distinctly angular in middle.
 - a†. Elytra with distinct testaceous patches
 - b†. Elytra without testaceous patches **H. DORSALIS, Muls.**
 - b*. Thorax as broad as elytra; inner thoracic furrows shallow and sinuous **H. JENEPENNIS, Thoms. (type form).**
 - a†. Thorax narrower than elytra; inner thoracic furrows shallow and sinuous **H. LATICOLLIS, Thoms.**
 - b. Elytra light brown, occasionally testaceous, with darker elytral markings plainly visible.
 - a*. Length $3\frac{1}{2}$ – $4\frac{1}{2}$ mm.; alternate interstices of elytra slightly raised **H. MULSANTI, Rye.**
 - b*. Length $2\frac{1}{2}$ – $3\frac{1}{2}$ mm.; alternate interstices of elytra never raised.
 - a†. Disc of thorax smooth or only slightly granulate; interstices of elytra rather broad and flat **H. AFFINIS, Marsh.**
 - b†. Disc of thorax strongly granulate; interstices of elytra narrower **H. BREVICOLLIS, Thoms.**
 - B. Last joint of maxillary palpi plainly thickened at base, penultimate hardly longer than broad.
 - a. Thorax with sides almost straight towards base; last joint of maxillary palpi longer, pear-shaped; punctuation of striae of elytra moderate **H. BREVIPALPIS, Bedel.**
 - b. Thorax with sides plainly sinuate before base; last joint of maxillary palpi very short, ovoid; punctuation of striae of elytra very coarse and strong **H. ARVERNICUS, Muls.**
 - 2. Frontal furrows in the form of a **T** or **M** the anterior furrow being furnished with longer or shorter longitudinal appendages; interstices of thorax shining, almost smooth **H. NANUS, Sturm.**

H. tuberculatus, Gyll. Oblong oval, black, shiny, elytra with a slight aeneous reflection; thorax strongly granulate, slightly iridescent, with not very deep furrows; elytra with strongly punctured striae, the alternate interstices, especially behind, raised in polished oblong tubercles; legs aeneous-black; this and the two succeeding species belong to the sub-genus *Emphourus*, Hope, which is distinguished by the wide epipleurae of the thorax and elytra; in the other species of *Helophorus* they are narrow.

Very rare; taken in the Manchester district by Mr. Chappell, and in Yorkshire by Mr. Lawson and Mr. Wilkinson.

H. rugosus, Ol. (*rufipes*, Bosc.). Oblong oval, rather broad; head reddish, granulate; thorax very transverse, dark, with reddish sides, sulcate and strongly ridged, the ridges interrupted and broken up into small knobs, anterior angles prominent; elytra brownish testaceous with distinct dark markings, hardly broader than thorax, almost parallel-sided, with plainly punctured striæ, alternate interstices strongly raised in ridges; near the suture at base are two short ridges; legs testaceous. L. $5-5\frac{1}{2}$ mm.

Rather local, but widely distributed throughout England and Wales, both inland and near the coast; not so common towards the north; Scotland, scarce, Lowlands, Tweed, Forth, Solway, and Dee districts.

H. nubilus, F. (*costatus*, Gæze). Very like the preceding, but much smaller, duller, and more unicolorous; thorax sulcate, interstices evenly raised in ridges, the ridges not interrupted, rather broader in proportion than the thorax of *H. rugosus*; elytra duller with the black markings not so apparent; legs reddish-brown. L. $3-3\frac{1}{2}$ mm.

Common and widely distributed in England. Scotland, local, Lowlands, Tweed, Forth, Tay, and Solway districts. Ireland, near Belfast and Waterford.

This species and the preceding prefer sandy places near water; the latter species, however, is often found in heaps of decaying rubbish or under leaves, or even by sweeping herbage, far from water. M. Perris has discovered the larva of one of these species of the sub-genus *Empleurus* in cabbage stalks devouring the larvæ of Haliçidæ.

H. intermedius, Muls. Oblong, moderately convex, shiny; head and thorax more or less iridescent, the latter with the sides testaceous yellow, somewhat rounded in front and thence straight to base; interstices of thorax finely granulate; elytra brownish testaceous with irregular dark markings, with ten moderately strongly punctured striæ on each, the alternate interstices distinctly but not strongly raised in ridges; legs testaceous: the species somewhat resembles a small *H. aquaticus*, from which it may be separated by the plainly raised ridges on elytra. L. 4-5 mm.

Local; brackish and fresh water; Sheerness, Rainham, Gravesend, Whitstable, Merton (Surrey); Hastings; Walton-on-Naze; Glanvilles Wootton; Brighton; Deal; Liverpool district.

H. aquaticus, L. (*grandis*, Ill.). Oblong; head and thorax iridescent (greenish bronze or coppery), more shining in male than female; antennæ and palpi testaceous, tip of latter often dark; thorax with internal furrows angular, with round granulations, which are sometimes less distinct on disc; elytra rather broader at base than base of thorax, disc rather flat, with a rather strong broad depression a little before base, dark testaceous with more or less distinct dark markings; on each elytron are ten rather strongly punctured striæ, with the punctures round, gradually weaker towards apex; between the first and second striæ at

base is a short row of punctures; alternate interstices slightly raised; legs testaceous; underside thickly pubescent. L. 5-7 mm.

Common and widely distributed throughout the kingdom.

The *v. aqualis* (*H. aqualis*, Thoms., *frigidus*, Grælls) is perhaps entitled to be considered a species, but it comes very close to the type form, and the differences are to a great extent comparative: it is smaller, and as a rule darker; the sides of thorax are less rounded, and the surface less closely granulose; the elytral interstices are not raised, and the depression before base is hardly traceable; the posterior tarsi have the second joint almost double as long as the third instead of only one and a half times as long, and the last abdominal segment is simple, and not minutely serrulated as in *H. aquaticus*. L. 4-6 mm.

Apparently not uncommon, and standing in many collections under *aquaticus*. Esher, Lincoln, Repton, &c.; also from Scotland.

In Mr. Matthews' collection there is a specimen of *H. aquaticus* with the alternate interstices strongly raised; it does not, however, appear to be anything but an abnormal form: it was taken many years ago in Oxfordshire.

H. dorsalis, Marsh (*quadrisignatus*, Bach. ? *æncipennis*, Thoms. var.). Oblong; head and thorax iridescent, greenish or coppery, the latter granulate, with the granulations more or less obsolete on disc, internal furrows angular in middle; elytra at base wider than base of thorax, dark bronze with distinct testaceous patches and markings, which are more or less regular, two before middle and two towards apex being usually especially conspicuous; punctured stria strong, interstices rather convex but not raised; underside dark, abdomen sometimes marked with yellow; legs testaceous, claws black. L. 3½-4 mm.

Rare: Hammersmith Marshes (formerly), Hampstead, Wimbledon, Claygate Lane (Esher); Hastings; Exeter; Holm Bush, Brighton; Glanvilles Wootton; Malvern; Northumberland district, rare; recorded from Dollar in Murray's Catalogue, but considered to be doubtfully Scottish by Dr. Sharp.

H. æncipennis, Thoms. (*granularis*, Gyll., *granularis* v. *obscurus*, Muls.). Oblong or oval-oblong; head and thorax iridescent, antennae and palpi testaceous, tip of latter sometimes dark; internal furrows of thorax always plainly angular in the type form; elytra dark testaceous, or, more commonly, of a dark brownish bronze colour with a distinct metallic reflection; punctured stria rather strong, interstices somewhat convex, but not raised; legs testaceous, claws dark. L. 3-4½ mm.

Common and widely distributed throughout England and Wales and Scotland; Ireland, near Waterford, and probably common.

Of all the species of *Helophorus* this is the most variable; several new species have been split off from it, and any one who examines a long series of specimens from various localities would have no difficulty in forming several others; *H. dorsalis*, Marsh, has been retained as a

species, but this also is by some authors referred to *H. anceipennis*; the chief varieties to be noticed are the following:—

V. planicollis (*H. planicollis*, Thoms.). Rather narrower than the type with the sides more parallel, the elytra being longer in proportion to thorax; the thorax is flatter, and has an evident depression just in front of the middle of the central channel; the femora are dusky black on the basal half (in the type only faintly darker at the extreme base); the punctures in the striae of the elytra are very evidently finer and closer, and the interstices are flatter and a little narrower.

Apparently not uncommon in the mountainous districts of Scotland and Ireland, but not found hitherto in England; it occurs as far north as Shetland.

V. strigifrons (*H. strigifrons*, Thoms.). Allied to the preceding variety, and also to the type form; it is, on the average, a little larger than either; the elytra are more strongly dilated behind the shoulders, and they have a broad reflexed margin, the space beyond the last stria being hardly, if at all, narrower than the widest interstice; the sides of the thorax are more regularly rounded; the longitudinal furrow on the head (which in type *anceipennis* and *v. planicollis* widens out forwards) is uniformly narrow; the internal furrows on the thorax are less angulated, and the alternate interstices are elevated; from *v. planicollis* it differs in having the punctures on the elytra much larger and not so close, and the femora almost entirely testaceous. (See Ent. Mo. Mag. xiii. 39, 40)

Apparently not uncommon in Scotland and Ireland, but not recorded from England.

V. crenatus, Rey. Allied to both the preceding varieties; it has a less thick-set form than *v. strigifrons*, and the sides of the thorax more rounded; from *v. planicollis* it differs in not having the frontal furrow widened in front, and in having the elytra more strongly crenate-striate than in that species.

Recorded from England by M. Pandellé, and probably to be found in our collections.

H. laticollis, Thoms. (*Idæ*, Power). This species, although related to *H. anceipennis*, appears to be very distinct; the thorax is broader, with sides more regularly rounded, and more convex, with the central furrow, and in fact all the thoracic furrows, narrower, shallower, and more even; the internal pair are not angular, and the outer pair are distinctly parallel to the margin; the elytra are more parallel-sided, of a dark brownish colour, sometimes but not often metallic, with stronger, somewhat crenate striae, and narrow interstices; the last joint of the maxillary palpi is stouter, and is usually entirely black (a character which at once distinguishes the species); legs brownish testaceous. L. 3–4 mm.

Taken by Dr. Power in some numbers at Woking, but not apparently recorded from any other locality.

H. Mulsanti, Rye. (*dorsalis*, Muls., *nee* Marsh). Oblong; head and thorax bronze green or coppery, iridescent, the latter with the sides often paler; internal furrows of thorax sinuous; alternate interstices of elytra slightly raised: this species somewhat resembles *H. brevipalpis*, from which it may be distinguished by its slender palpi and larger size; from light specimens of *H. univittatus* the sinuous internal furrows of thorax will separate it; while from *H. affinis* it differs entirely in size, shape, and sculpture; from all three the slightly raised interstices of elytra will distinguish it; the underside is hardly pubescent; legs testaceous. L. $3\frac{1}{2}$ –4 mm.

Local; not uncommon near London, Lee, Chatham, Rainham, Darenth Wood, Dorking, Wimbledon, Mickleham, Earlswood; Lymington Salterns; Liverpool (taken commonly by Crotch); Scotland, local; abundant in pools of salt water by the side of the Nith below Dumfries, but not recorded from any other locality.

H. affinis, Marsh (*Erichsoni*, Bach., *dorsalis*, Er., *griseus*, Thoms.). One of our smallest species; head and thorax usually very strongly metallic, bright green or bright red, the latter almost smooth on disc; antennæ and palpi yellow-testaceous, tip of last joint of latter sometimes dark; elytra lighter or darker testaceous with dark markings distinct, punctured striae not very strong, interstices broad and flat; legs testaceous. L. 2–3 mm.

This species does not appear to be nearly as common as *H. brevipalpis*, with which it appears to be mixed in collections. Dr. Sharp considers that it is doubtful whether it occurs at all in Scotland: it may easily be distinguished from *H. brevipalpis* by the elongate last joint of the maxillary palpi, and in a less degree by the broader and flatter interstices of the elytra; in this latter point, however, it is somewhat variable. In Mr. Matthews' collection there is a large specimen 4 mm. in length.

H. brevicollis, Thoms. (*granularis*, L.?, *griseus*, Herbst?). This is a somewhat doubtful species; it closely resembles the preceding, but the elytra are somewhat narrower, more parallel-sided, and more pointed at apex; the disc of the thorax is distinctly granulated, and not smooth or nearly smooth as in the preceding species; the interstices of the elytra are narrower and more convex; from the succeeding species it is distinguished by the elongate last joint of the maxillary palpi. L. $2\frac{1}{2}$ mm.

Rare; two specimens recorded by Mr. Blackburn from Killarney, and two in Dr. Power's collection from the London district that seem to agree with a type specimen sent me by M. Bedel, are all that I know of, but it is very likely mixed with the preceding in many collections.

H. brevipalpis, Bedel (*griseus*, Er., *granularis*, Thoms.). Colour rather variable; head and thorax iridescent, but sometimes dull; antennæ and palpi testaceous or more or less dark, last joint of latter dilated at base, not elongate; thorax granulate on disc as well as at sides; elytra lighter or darker testaceous with dark markings plainly visible, with rather strong punctured striae, interstices not broad and slightly convex; legs brownish testaceous. L. $2\frac{1}{4}$ mm.

Common and widely distributed throughout the kingdom.

As the great confusion that has arisen with regard to these small species of *Helophori* is in great measure due to the indiscriminate way in which the names *griseus* and *granularis* have been applied now to one species and now to another, they have been entirely dropped, it being quite impossible to determine which species have the prior claim to be called by these names.

H. arvernicus, Muls. One of our most distinct species; head and thorax rather obscurely metallic, greenish or reddish; antennæ and palpi reddish, last joint of latter dilated, short oval; thorax with sides rounded in front, contracted and sinuate behind, entirely granulated, rather dull; elytra rather short in proportion to thorax, usually dark brown, but with the darker markings distinctly traceable, with strong and very strongly punctured striæ; interstices convex, alternate ones somewhat raised; legs brownish testaceous. L. 3 mm.

Local; a northern and mountainous species as a rule: once taken by Dr. Power at Horsell (Surrey); Snowdon; banks of the Bollin, Cheshire; Scotland, local, Lowlands, on sandy banks by the sides of rivers, Tweed, Solway, Clyde, Tay, Dee, and Moray districts.

H. nanus, Sturm. Oblong-oval; head and thorax bronze with reddish or greenish reflection which is often absent, antennæ and palpi testaceous, apical half of last joint of latter usually dusky; thorax with almost straight, even, and regular furrows, the spaces between being almost smooth and shining, that between the last furrow and the margin being the most roughened; elytra darker or lighter brown with bronze reflection, with strong punctured striæ, interstices rather narrow and somewhat depressed; underside pubescent, black with a greenish metallic tinge; legs testaceous, tarsi somewhat darker; the sculpture of the thorax and the form of the frontal furrows will at once distinguish this species from any other: it is said to have only eight joints to the antennæ instead of nine, the regular number, but this fact does not appear to have been satisfactorily established; if it is the case, the species must be formed into a new genus. L. $2-3\frac{1}{4}$ mm.

Very local; taken abundantly by Dr. Power at Lee, Kent; Guestling, near Hastings (Butler); it has also occurred in Horning Fen: the species varies very much in size.

HYDROCHINA.

The members of this tribe have the clypeus truncate and not emarginate, and by this are distinguished from the *Spercheina*; besides the points before mentioned under *Helophorus*, they differ from that genus in having the abdomen with six or seven segments instead of five, the last being often membranous; the short second joint of the posterior tarsi will also at once distinguish them; all the species belonging to the tribe are very small: an account of our three British genera (*Hydrochus*, *Oethebius*, and *Hydrona*) will be found given by myself in the Entomologist for July, 1884. I have since then come to the conclusion that

the old genus *Henicocerus*, Steph., should be separated from *Orthobius*, and I find that M. Bedel is of the same opinion: the peculiar formation of the palpi seems to afford a good generic character.

- I. Maxillary palpi with their last joint at least as long as the preceding.
 1. Maxillary palpi much shorter than head and thorax; eyes very prominent *HYDROCHUS*, *Leach*.
 2. Maxillary palpi at least as long as head and thorax; eyes not prominent *HYDRENA*, *Kug*.
- II. Maxillary palpi with their last joint subulate, shorter than the preceding.
 1. Last joint of maxillary palpi very short, penultimate much dilated *HENICOCERUS*, *Steph*.
 2. Last joint of maxillary palpi half as long as the preceding, penultimate joint oblong, contracted in front *OCTHEBIUS*, *Leach*.

HYDROCHUS, *Leach*.

This genus comprises about thirty species, chiefly from Europe and North America; species, however, occur also in Asia (Siberia, India, and Ceylon), Northern Africa, and Oceania; the genus is also represented in South America; they are easily distinguished from the other Hydrophilidæ by their projecting eyes, and the very strong punctuation of the elytra, of which the alternate interstices are often raised; the under side is clothed with a silky pubescence; the upper side is sometimes black, but more often metallic and iridescent; the species are very poor swimmers, and their movements are exceedingly sluggish; they are found attached to plants in stagnant or slowly moving water. Four out of nine or ten European species are found in Britain.

- I. Form short and thick; elytra broad oval, much widened behind middle *H. BREVIS*, *Herbst*.
- II. Form elongate; elytra oblong or long oval, not much widened behind middle.
 - i. 3rd and 5th interstices of elytra raised in ridges.
 1. Ridges of 3rd and 5th interstices effaced behind; length 3-4 mm. *H. ELONGATUS*, *Schall*.
 2. Ridges of 3rd and 5th interstices not effaced behind; length 2½-3 mm. *H. CARINATUS*, *Germ*.
 - ii. Elytra without any interstices raised in ridges . . . *H. ANGUSTATUS*, *Germ*.

H. brevis, *Herbst*. Black or metallic black, rather shining; head and thorax thickly and coarsely punctured, the latter scarcely longer than broad, sinuate before posterior angles, with seven irregular depressions, not very plainly marked as a rule, arranged in two transverse rows, three in front and four behind; elytra short, oval, much broader than thorax, considerably widened behind middle, and thence narrowed to apex, with very strongly punctured, crenate striae, alternate interstices raised; underside pubescent, silky black; legs rather slender, pitchy, or reddish black. L. 2½-3 mm.

Rare; Hoveyton, Horning Fen, Woodbastwick (Dr. Power); Gundley, Market

Harborough (Rev. A. Matthews); Northumberland, Gosforth (Mr. Bold); Scotland, very local, Lowlands, Tweed, Forth, Tay, and Clyde districts (Perth, Dumfries, &c.).

H. elongatus, Schall. Elongate, head and thorax metallic black or green, coarsely punctured, the latter plainly longer than broad, with five distinct depressions arranged in two transverse rows, the anterior containing three and the posterior two; elytra black or brownish with strongly punctured, crenate striae, alternate interstices raised in ridges, third and fifth effaced behind; underside silky black; legs pitchy: this is the largest of our species. L. $3\frac{1}{2}$ – $4\frac{1}{2}$ mm.

Widely distributed throughout England, although somewhat local; apparently commoner in the Midlands and south than in the north; Scotland, rare, Lowlands, Forth district only.

Occasionally this species has the upper surface entirely metallic green or bronze.

H. carinatus, Germ. Very like the preceding, but considerably smaller and narrower; the depressions on the thorax are shallower, and may be reckoned as seven in number instead of five, as two are rather indistinctly traceable near the posterior angles; the third and fifth interstices of the elytra, also, are not effaced behind as in *H. elongatus*. L. $2\frac{1}{3}$ – $2\frac{1}{2}$ mm.

A fen species; very local; first taken in 1859 in Holme Fen, Huntingdonshire, by Mr. Dossetor, and since then in Wicken Fen, Cambridgeshire, and other localities near Cambridge.

H. angustatus, Germ. Elongate; upper side usually metallic green or bronze, but sometimes the elytra are brown or violet, or the whole body is of a metallic violet colour or almost black; head and thorax strongly punctured, the latter with five or seven depressions, the two outside ones in the posterior row being often obliterated; elytra with strongly punctured, crenate striae, with none of the interstices raised in ridges; this character will at once separate this species from the other three; underside silky black; legs reddish, knees and extremities of joints of tarsi usually dark. L. 2 – $3\frac{1}{2}$ mm.

Common and widely distributed in the Midlands and south of England, but apparently less common further north: it is not recorded by Mr. Bold from Northumberland and Durham, and in Scotland is rare in the Tweed, Forth, and Clyde districts.

HENICOCERUS, Stephens.

This genus comprises three species, all European, of which we possess one as British; they are found in running streams under stones, and occur chiefly in mountainous or hilly districts: the shape of the palpi and the difference of the sculpture of the thorax in the sexes serve to mark the genus.

The transformations of *Henicocerus exsculptus* are described by Wailes (Ent. Mag. 1833, p. 256) and Westwood (Classification, i. 121): the species are found in the crevices of stones in rivulets, just level with or a little above the surface; the larvæ

are found, in company with the perfect insects, in the autumn: they are anopluri-form or louse-shaped, measuring when full grown about 5 mm. in length, and 1 mm. in breadth; they are of a uniform black colour, and have the apex of each abdominal segment fringed with very short hairs; their food is probably mucor, and they prefer rough shiny stones; when full grown, they leave the water, and construct, upon the edges of the stone, a small cell, by agglutinating together small particles of mud. These cells are sometimes very numerous, giving the fragment of stone a curious appearance; the pupa is of an orange colour, and the imago, when hatched, gnaws its way through its prison. Mulsant (*Palpicornes*, Plate, Fig. 1) gives the figure of a larva that he believes to be that of *H. granulatus*: the head and thoracic segments are very broad, and the abdominal segments are gradually narrowed to the ninth which bears two moderately long, setose cerci, which serve as organs of respiration (l. c. p. 53).

H. exsculptus, Germ. Colour variable, some examples being of a dull black, others shining bronze, while occasionally specimens are met with in which either the thorax or elytra, or the base of both, are of a bright metallic blue colour; head coarsely punctured in female, more diffusely in male, eyes rather prominent, antennæ reddish, club dark; thorax somewhat cordiform, strongly contracted behind, broadly dilated and flattened in front at sides, with a strong central furrow and two impressions on each side, one round, the other oblique; elytra short oval, considerably broader than thorax, with strongly punctured, crenate striae; legs reddish testaceous, joints usually darker; in the male the thorax is very convex, rather finely and diffusely punctured; the anterior impression is almost obsolete, and the posterior is reduced to a slender line; in the female the thorax is flatter, and both impressions are very large and deep. L. $1\frac{1}{2}$ mm.

Local and not common in England; North Wales; Church Stretton; Ezzington, near Burton-on-Trent (very rarely); Halifax; Northumberland; Scotland, common, Tweed, Forth, Solway, Clyde, and Moray districts.

OCTHEBIUS, Leach.

This genus comprises about fifty species, which are widely distributed over the surface of the globe from the north of North America to South Africa; the greater part, however, occur in the northern and temperate regions of the world; they are found in both stagnant and running water; some species are confined to blackish ponds and ditches, and according to M. Bedel some occur exclusively in muddy cavities in rocks which are covered by the sea at high tides: the chief points of distinction between the species are found in the sculpture of the disc of thorax, the membranous border or posterior angles of the thorax (which latter are often excised and filled with membrane), and the sculpture of the elytra: the sculpture of the disc of thorax is chiefly of two kinds, and consists either of a central furrow with a transverse line above and below it (like an **H** laid on one side), the under line being more or less curved, and secondly of a central furrow with two impressions on each side, the front ones circular and the posterior ones oblique and converging towards the base of the central furrow, presenting the appearance

of a straight line with a semicolon, more or less distinct on each side of it ($\epsilon \mid \delta$).

The transformations of *Oethebius* are described by M. Mathan, Ann. Fr. 1865, p. 201.

About half the European species of *Oethebius* are found in Britain; three of these, *O. margipallens*, *O. exaratus*, and *O. Poweri*, are very minute, not, or scarcely exceeding 1 mm. in length; one, *O. punctatus*, is considerably larger, reaching 3 mm.; the remainder vary from $1\frac{1}{2}$ –2 mm.: in determining the species the character of size will be found of great service.

- I. Upper surface glabrous; length not exceeding $1\frac{3}{4}$ mm.; elytra punctured in rows.
 - i. Thorax with a more or less distinct central furrow with transverse impressions above and below.
 1. Transverse impressions of thorax continued to sides; length 1 mm. *O. EXARATUS*, Muls.
 2. Transverse impressions of thorax not continued to sides.
 - A. Length $1-1\frac{1}{4}$ mm.; elytra bronze . . . *O. MARGIPALLENS*, Latr.
 - B. Length $1\frac{3}{4}$ mm.; elytra more or less castaneous *O. MARINUS*, Payk.
 - ii. Thorax with well-marked central furrow, but no impressions on disc.
 1. Head almost smooth; punctuation weak; colour golden-brassy *O. ÆNEUS*, Steph.
 2. Head rugosely punctured; punctuation strong; colour dark brassy *O. PYGMEUS*, F.
 - iii. Thorax with central furrow and two well-marked impressions (forming a more or less distinct semicolon) on each side.
 1. Length $1\frac{3}{4}$ mm.; legs red or reddish-yellow.
 - A. Punctuation of elytra strong; striae distinct.
 - a. Thorax unicolorous; elytra longer . . . *O. BICOLON*, Germ.
 - b. Thorax with margins broadly red; elytra shorter and more ovate *O. RUFIMARGINATUS*, Steph.
 - B. Punctuation of elytra fine; striae hardly visible *O. NANUS*, Steph. (*æaratus*, Steph.).
 2. Length 1 mm.; legs dark *O. POWERI*, Rye.
- II. Upper surface strongly pubescent; length 3 mm.; elytra confusedly punctured *O. PUNCTATUS*, Steph.

O. exaratus, Muls. Brown-black, shining, elytra sometimes rather lighter; head large, thorax transverse with a deep central furrow and two transverse furrows reaching sides which at once distinguish it from all the other species; posterior angles broadly excised and filled with membrane; elytra short oval, convex, with ten rows of strong, almost square punctures on each, which become feebler behind; legs red. L. 1 mm.

Very local and as a rule rare: it has, however, been found in abundance by Dr. Power (who introduced it as British), and also by Mr Champion. Gravesend; Whitstable; Southend; Rainham; Lewes: it occurs in brackish ditches.

O. margipallens, Latr. (*pusillus*, Steph.). Oval, moderately convex; upper surface dark bronze with a more or less distinct greenish reflection; thorax transverse, gradually contracted to base and furnished along both sides with a narrow membranous border that becomes gradually wider to base, with a central furrow and a transverse impression above and below, the latter often irregularly widened, and rather shallow and indistinct; elytra hardly broader than thorax with moderately strongly punctured striae, interstices rugose; legs reddish testaceous. L. $1\frac{1}{4}$ mm.

Locally abundant; occurs chiefly, but not always, in brackish ditches; Whitstable, Sheerness, Gravesend, Harwell, Lewisham, Rainham; Bognor; Perwell Bay; Barmouth and North Wales; apparently not found in the north of England, or in Scotland.

O. marinus, Payk. (var. *pallidus*, Dej.). Oblong, moderately convex; head and thorax green or brassy-green or coppery; the latter transverse, with margins sometimes testaceous, with a membranous border narrow in front and wider behind, marked on disc with a central furrow and a transverse impression in front and behind; elytra rather long, wider than thorax, reddish brown or castaneous, sometimes with a metallic reflection, with ten punctured striae on each, the punctures being moderately strong and almost square; in the lighter examples the striae are hardly apparent; legs testaceous. L. $1\frac{3}{4}$ mm.

Brackish ditches; rather common and widely distributed along the sea coast; not so common in the north; Scotland, local, Forth and Solway districts.

O. æneus, Steph. Ovate, very shining; head and thorax of a brilliant metallic golden or golden-coppery colour, margins of latter reddish testaceous; thorax rather diffusely punctured with sides contracted towards base, posterior angles excised and filled with membrane; disc with a central furrow and no other distinct impressions; elytra rather broad, widest behind middle, of a light brown or testaceous colour with brassy reflection, punctured striae rather weak; apex of elytra somewhat acuminate; legs testaceous. L. $1\frac{1}{2}$ mm.

Rare; taken by Dr. Power at Birdbrook (Essex), Cowley (near Uxbridge), Harwell, and Horsell, also by Mr. Blatch in the Isle of Wight; it has also occurred at Putney and Woking; it is found in stagnant fresh-water ditches.

O. pygmæus, F. (*impressus*, Marsh.). Ovate, dark bronze, with a slight greenish reflection; thorax transverse, strongly punctured, narrowed behind, posterior angles rather narrowly excised and filled with membrane, marked on disc, as in the preceding species, with a central furrow and no other distinct impressions; elytra oval, widest behind middle, with a rather strong lateral margin, punctured striae strong, interstices rugose; legs reddish testaceous. L. $1\frac{1}{4}$ mm.

Stagnant ponds and ditches; the commonest species of the genus in the Midlands and south of England; not so common, apparently, farther north; Scotland, local, and found as yet only near the coast, Tweed, Forth, and Solway districts; as a rule, it is by no means a maritime insect; it is easily distinguished from the

preceding species by its much darker and less metallic colour, and the much stronger sculpture of the elytra.

O. bicolon, Germ. (*impressicollis*, Cast.). Upper side bronze or bronze-brown, shiny; thorax very transverse, very strongly punctured with sides contracted behind, posterior angles excised and filled with membrane, disc marked with a central furrow and two strong impressions on each side, the anterior circular, the posterior oblique or almost semi-circular, forming together a semicolon; elytra with strongly punctured striae; legs reddish testaceous, tarsi darker. L. $1\frac{3}{4}$ mm.

Ponds and ditches, inland, and near the coast, usually the latter; rather common and widely distributed in England and Wales; Scotland, local, Lowlands, Forth and Solway districts.

O. rufimarginatus, Steph. Closely allied to the preceding species, of which it is considered by most authors to be merely a variety; it is distinguished by its shorter form, the elytra being considerably shorter and thicker in proportion than in *O. bicolon*, duller appearance, and the broadly reddish margins of thorax. L. $1\frac{1}{4}$ – $1\frac{1}{2}$ mm.

Rare; stagnant ponds and ditches both fresh and brackish; Sheerness, Maidstone, Birdbrook, Lee, Tottenham; Hastings; Scarborough; Northumberland, The Wansbeck; I have taken it at Repton, Burton-on-Trent, in flood rubbish, unaccompanied by the previous species. Scotland, local, Lowlands, Forth and Solway districts.

O. nanus, Steph. (*aratus*, Steph.). Oblong-ovate, dark-bronze, almost black; head large, eyes very prominent; thorax transverse, but rather longer than in some of the preceding species, sides excised from a little behind middle and filled with clear white membrane; elytra with rows of rather weak punctures set in very feeble, almost obsolete, striae; apex of elytra almost truncate; legs reddish, knees darker: the duller and less metallic colour and smoother elytra will at once distinguish this from the preceding species. L. $1\frac{1}{2}$ – $1\frac{3}{4}$ mm.

Brackish ponds and ditches; also in fresh stagnant water; local, but not uncommon in the Midlands and south of England, but not recorded from the extreme north or from Scotland. Whitstable; Sheerness; Ramsgate; Deal; Hastings; Shoreham Brighton; Hunstanton; Southport; Cambridgeshire and Huntingdonshire Fens.

O. Poweri, Rye. Elongate-ovate, dull, pitchy-black; thorax transverse, strongly dilated in front and contracted behind, coarsely punctured, anterior angles somewhat prominent, posterior angles excised and filled with membrane, disc with a central furrow and two impressions on each side; elytra with strongly punctured striae; legs reddish, knees and tarsi dark; the palpi also are pitchy. L. 1 mm.

One specimen taken by Dr. Power at Seaton, Devonshire, and several by Dr. Sharp and Mr. Crotch near the Chesil Bank, Weymouth.

The small size of this species prevents its being confounded with any other except *O. exaratus*, and small specimens of *O. marginipallens*, from both of which the sculpture of the thorax at once distinguishes it.

O. punctatus, Steph. (*hibernicus*, Curt.). Elongate, dark-brassy, somewhat iridescent, upper surface clothed with long pubescence; thorax transverse, with sides rounded, posterior angles excised and filled with membrane, disc with a dorsal furrow and two impressions on each side; there are also two lateral impressions united by an impressed line; elytra thickly and confusedly punctured; legs reddish testaceous, tarsi dark; the apex of palpi is also dark. L. 3 mm.

Local; occurring only in the south-east and south of England: Sheerness; Worthing; Isle of Wight; Lymington Salterns; Pegwell Bay; *O. hibernicus*, which appears to be synonymous with this insect, has been taken near Belfast and Portmarnock.

(I have received from Mr. W. G. Blatch a specimen of *Oethebius* which was taken by himself at Clacton-on-Sea, and returned to him from the Continent as *O. impressicollis*, Lap.: the specimen appears to agree with a rather dull reddish variety of *O. bicolor* taken by Mr. Champion in Sheppy, and forms perhaps the connecting link between this latter species and *O. rufimarginatus*. The synonymy in the last European catalogue is as follows: *O. bicolor*, Germ. = *striatus*, Lap. = *rufimarginatus*, Steph.; *O. impressicollis*, Lap. = *bicolor*, Steph.)

HYDRÆNA, Kugelann.

About thirty species are comprised in this genus, chiefly from Europe, but a few come from North America, Teneriffe, &c., and one from Australia; they are chiefly remarkable for their very long maxillary palpi; they are usually black or reddish brown, and have no metallic lustre like the *Oethebii*; they are, as a rule, found in running water, attached to stones or logs; like their allies they are very poor swimmers; the males and females differ considerably in the shape of the palpi and tibiæ, and also sometimes of the femora: the species are in many cases hard to determine: the chief characters are found in their general shape and colour, and also in the number of the rows of punctures between the suture of the elytra and the humeral angle; the under surface is clothed with thick silky pubescence.

I. Each elytron with more than six rows of punctures between the suture and the humeral angle.

- | | |
|---|---------------------|
| i. Thorax testaceous with the disc at most darker, elytra more or less testaceous | II. TESTACEA, Curt. |
| ii. Thorax dark with the extreme margins only testaceous | II. PALUSIS, Er. |
| iii. Thorax entirely dark. | |

1. Elytra with sides more or less rounded; thorax with oblique impressions indistinct; rows of punctures between suture of elytra and humeral angle 9 or 10.

- | | |
|---|--------------------|
| A. Size larger; elytra not dilated behind | II. RIPARIA, Kütz. |
| B. Size smaller; elytra dilated behind | II. NIGRICA, Germ. |

2. Elytra with sides almost parallel; thorax with two strong oblique or longitudinal impressions; rows of punctures between suture of elytra and humeral angle 8

II. ANGUSTATA, Sturm.

II. Each elytron with at most six rows of punctures between the suture and the humeral angle.

i. Punctuation of elytra very strong and regular and plain to apex.

1. Length 2 mm.; elytra parallel-sided, rounded at apex only

H. GRACILIS, Germ.

2. Length $1\frac{1}{2}$ mm.; elytra with sides rounded and dilated behind middle, sharply truncate at apex

H. ATRICAPILLA, Wat.

ii. Punctuation of elytra more or less confused, especially towards apex.

1. Thorax cordiform, sides sinuate; elytra confusedly punctured

H. PYGMEÆ, Wat.

2. Thorax hexagonal; elytra punctured in feeble rows on disc

H. PULCHELLA, Germ.

***H. testacea*, Curt.** Head black, strongly punctured, palpi testaceous; thorax about as long as broad, sides feebly angular in middle, contracted towards base, testaceous with disc darker, strongly and somewhat rugosely punctured; elytra testaceous, widened behind, each with eight rows of strong punctures between the suture and humeral angle; underside black; metasternum with three raised lines, the middle one bifurcate: this latter character serves to distinguish this species from all the others. L. $1\frac{1}{2}$ – $1\frac{3}{4}$ mm.

Local; found in both stagnant and running water; Lee, Battersea Fields, Epping, Woking, Cowley; Holm Busb, Brighton; New Forest; Wicken Fen; York; Scotland, rare, Lowlands: in pools by the side of the Cairn at Irongray in the Solway district.

***H. palustris*, Er.** Considerably smaller than the preceding; head black, strongly punctured, palpi testaceous; thorax black, quadrate, contracted behind, strongly punctured, with extreme margins usually plainly, but sometimes obscurely, testaceous; elytra considerably broader than thorax, rather widened behind, with nine or ten rows of moderately strong punctures between the suture and humeral angle; legs testaceous. L. $1\frac{1}{3}$ mm.

Stagnant ponds and ditches; rare, and very local; it may usually be found sparingly at Askham Bog, York, and it has also been taken at Cowley (London district), and in Bewdley Forest.

***H. riparia*, Kug.** Rather elongate; head and thorax brownish-black, the former rugosely punctured in front, the latter with the length a little less than the breadth in middle of sides where they are slightly angular, and thence contracted in almost a straight line to base; punctuation of thorax strong; elytra brownish-black or blackish with sides subparallel, not, or very slightly dilated behind, with nine or ten rows of almost square punctures on each between the suture and the humeral angle; legs and palpi reddish testaceous. L. $2\frac{1}{3}$ – $2\frac{1}{2}$ mm.

Found in both stagnant and running water; common and widely distributed throughout the country; Scotland, common, Lowlands; Ireland, near Dublin and Waterford, and probably common.

***H. nigrita*, Germ. (*pusilla*, Steph.).** Very like the preceding, with

small specimens of which it is often confounded, but it is a smaller species; the colour is darker, and the extremity of the last joint of the palpi is often, but not always, blackish; the elytra are rather short oval with the sides rounded and much more evidently dilated behind than in the preceding species, and the punctures are almost round; the lateral margin of the elytra is prolonged to the shoulder, whereas in *H. nigrita* it is effaced before it reaches it. L. $1\frac{1}{2}$ –2 mm.

Usually found in running water, under stones; local, and not common; Birdbrook (Essex); Holm Bush (Brighton); Hastings; Knowle (Birmingham); Bewdley Forest; Repton, Burton-on-Trent; Llanccollen and other Welsh localities; Hartlepool; Northumberland district; Scotland, local, Lowlands, Tweed and Forth districts; Ireland, near Waterford (Dr. Power).

H. angustata, Sturm. Rather elongate, black, or castaneous brown; palpi testaceous, apex usually blackish; thorax a little broader than long in middle where the sides are somewhat angular, sinuously contracted to base, with two deep oblique impressions, disc very scantily punctured, sides rather closely punctured; the lateral impressions also of thorax are very distinct; elytra rather parallel-sided, with eight rows of strong, almost square, punctures; legs reddish testaceous. L. $1\frac{1}{2}$ –2 mm.

Rare; not found in the Midlands or south of England; Hartlepool; Northumberland district (The Wansbeck, Wallington, &c.); Scotland, rare, Lowlands, Tweed, Solway, and Clyde districts (Falkirk, Glasgow, &c.). It was first discovered in Britain by Dr. Power at Blair Bank, Polmont, Glasgow.

This species is somewhat difficult to determine, but may be distinguished from *H. riparia*, with which alone it is likely to be confused, by the distinct impressions of thorax, the sides of which are more sinuate towards base, and by the smaller number of rows of punctures on the disc of elytra, which give the insect a more coarsely punctured general appearance.

H. gracilis, Germ. One of our most distinct species; narrow, elongate, and depressed; of a shining black or dark castaneous colour with the elytra and margins of thorax often, but not always, lighter; palpi reddish testaceous; thorax about as long as broad with the sides dilated in middle in a rounded obtuse angle, rather coarsely punctured, more closely at sides than on disc; lateral impressions distinct; elytra long, parallel-sided, hardly broader than thorax, not contracted until a little before apex, with six rows of large and not very closely set punctures between the suture and the humeral angle; legs reddish testaceous, external margins of femora and tibiæ sometimes dusky; male with the femora slightly thickened and the posterior tibiæ ciliated on their internal margin. L. 2 mm.

Local but not uncommon in the Midlands and the north of England, but rarer further south, and apparently not found in the London district and the southern counties; Scotland, common both Lowlands and Highlands.

H. atricapilla, Wat. (*flavipes*, Sturm, *pusilla*, Her.). Head

black; thorax black or brown with margins more or less broadly testaceous, more closely punctured at sides than on disc, sides obtusely angled just behind middle in female, more rounded as a rule in male, rather strongly contracted to base; elytra castaneous brown, oblong, with sides moderately rounded, apex obliquely truncate, with six rows of strong rather square punctures on each between the suture and humeral angle; male with the last joint of the maxillary palpi thickened and excised on its inner margin towards apex, so that the apex is pointed; legs testaceous. L. $1-1\frac{1}{3}$ mm.

Local; a northern species; usually found in running water attached to stones; Knowle, near Birmingham; Derbyshire; Scalby Beck, Yorkshire; Lancaster (River Lune); Northumberland district (The Wansbeck, Wallington, &c.); Scotland, rare, Lowlands, Tweed, Forth, and Solway districts.

H. pygmæa, Wat. (*Sieboldi*, Rosh.). Rather short and broad, depressed, shining castaneous brown, disc of thorax usually more or less darker; head black or dark brown; thorax cordiform, rather wide in front, strongly and sinuously contracted to base, coarsely and diffusely punctured, especially on disc; elytra short and broad, more so in female than in male, with six rows of rather large but not deep punctures on each between suture and humeral angle, which are somewhat irregular, and behind the middle are hardly traceable; apex rounded; male with the femora a little thickened, and the posterior tibiæ strongly thickened inside from about middle to base; female with the surface of the elytra somewhat depressed behind middle, so that the suture appears somewhat raised; legs reddish testaceous. L. $1\frac{1}{3}-1\frac{2}{3}$ mm.

Rare; Scarborough; Northumberland district (The Wansbeck, &c.); Scotland, rare, Lowlands, Solway district only.

H. pulchella, Germ. A small species, rather elongate and depressed, brownish or yellowish testaceous with the head black and the disc of thorax more or less dusky; palpi clear yellow; thorax broader than long in the middle where the sides are angled and thence contracted to base, rather strongly and moderately closely punctured; elytra oblong-oval, with six rows of rather feeble punctures on each between suture and humeral angle, punctuation confused towards sides and behind middle, but usually more or less regular on disc; apex rounded; legs clear yellow-testaceous. L. $1-1\frac{1}{3}$ mm.

Rare; in running water; River Dove, near Burton-on-Trent; Derbyshire; Scalby Beck, Yorkshire; Stretford, near Manchester; Northumberland district; Scotland, rare, Lowlands, Forth, Tay, and Solway districts.

These three species appear to present some difficulty, probably because the latter two are so rare that other species are mistaken for them: *H. atricapilla* may at once be distinguished by the truncate apex of its elytra, very strong and regular punctuation, and the thickened joint of the maxillary palpi in male; *H. pygmæa* by its thick broad elytra, more or less confused punctuation, and the thickened tibiæ of male; *H. pulchella* by its feeble and irregular punctuation, small size, and lighter

colour; the latter species cannot be confused with any other except light specimens of *atricapilla*, from which it may at once be separated by the rounded apex of its elytra, and different sculpture.

It is worthy of note that only two species of *Hydrena* (*H. testacea* and *H. riparia*) appear to occur in the London district, and only two or three species are found in the south of England, whereas all the British species, with the exception of *H. palustris*, are found in the Northumberland district, and in Scotland; this is the more strange as several of our rarer northern species (*H. angustata*, *pygmaea*, *pulchella*, &c.) are found in France, and there is no reason why we should not find them widely distributed in England; it is quite possible that owing to their rarity and their minute size they have been passed over by collectors.

SPHÆRIDIINÆ.

The second sub-family of the Hydrophilidæ, the Sphæridiinæ, appear both by their structure and habits to form the connecting link between the Hydrophilidæ and the Silphidæ; they are, as a rule, terrestrial in their habits, and were accordingly named Geophilidæ by Mulsant, as opposed to his other division Hydrophilidæ; several species, however, are subaquatic, being found in damp places, in moss by the side of ponds and streams, or even in the water; they feed on decaying vegetable matter, and may be found in great numbers in dung, especially that of herbivorous animals; the species of the large genus *Cereyon*, in spite of their minute size, by reason of their countless numbers form one of our most useful scavenging agencies, and in conjunction with the Aphodii, Geotrupes, and other Necrophaga, do the greatest service in partly clearing off the dung through its consumption by their larvæ, partly in riddling it through and through with holes and galleries so that the rain is able freely to percolate through it and wash it into the ground.

The Sphæridiinæ are, as their name implies, round, convex, sometimes almost hemispherical insects; they are sometimes fully striated, sometimes smooth except for a sutural stria; the maxillary palpi are not so strongly developed as in many of the Hydrophilidæ, but they are often as long as or slightly longer than the antennæ; the onychium or last joint of the anterior tarsi is very long, as long as or longer than the four others united, and is often considerably dilated in the males; the first joint also of the posterior tarsi is elongate, a character which at once separates the family from the Hydrophilidæ, in which the first joint is very short and often hidden so that the tarsi appear tetrameric; the tibiæ are spinose and adapted for digging; good generic characters are found in the shape of the scutellum, and also in the form of the metasternum, which as a rule is much longer than broad, but in *Megasternum* and *Cryptopleurum* is very broad, the breadth exceeding the length.

The larvæ of this family are destitute or virtually destitute of legs, and in this differ widely from those of the Hydrophilinæ, which are furnished with distinct legs

and are much more active : this is a natural consequence of their predatory habits ; the larvæ of the *Sphæridiina*, on the other hand, being entirely feeders on dung or decaying matter, and being hatched in the midst of their food, do not require to move from one place to another, and hence, as in many of the larvæ of the *Diptera*, &c., the legs are not developed.

In Gemminger and von Harold's catalogue seven genera are enumerated, five of which are represented in the British fauna ; they may be distinguished as follows :—

I. Elytra with sutural stria only.

i. Scutellum in an equilateral triangle ; pygidium hidden *CYCLONOTUM*, *Er.*

ii. Scutellum twice as long as broad ; pygidium visible *SPHÆRIDIMUM*, *F.*

II. Elytra regularly punctured in rows, or with distinct punctured striae.

i. Mesosternum narrow ; epipleuræ plainly visible along meso- and meta-sternum *CERCYON*, *Leach.*

ii. Mesosternum very broad ; epipleuræ wanting.

1. Anterior tibiæ strongly emarginate externally at apex ; thorax margined ; upper surface without pubescence *MEGASTERNUM*, *Muls.*

2. Anterior tibiæ entire ; thorax not margined ; upper surface finely pubescent *CRYPTOPLEURUM*, *Muls.*

(Figures of the undersides of all these five species are given by Mulsant in his *Histoire Naturelle des Coleoptères de France*, Palpi-cornes, in the single plate at the end of the part.)

CYCLONOTUM, Erichson.

According to the Munich Catalogue this genus comprises thirty species, but several of these must be referred to *Dactylosternum*, Woll. ; they are widely distributed over the surface of the globe.

C. orbiculare, F. Short oval, convex, shining black, upper surface distinctly and thickly punctured, funiculus of antennæ, and tarsi, red ; maxillary palpi shorter than antennæ, last joint bluntly acuminate ; posterior angles of thorax rounded ; scutellum large ; sutural stria well marked from apex to beyond middle ; legs short, femora broad, coarsely punctured. L. 4–5 mm.

At roots of grass and under rubbish in marshy places, also in damp moss at the sides of ponds ; common and widely distributed ; often found in company with *Chatarthria* ; Scotland, somewhat local, but widely distributed.

SPHÆRIDIMUM, Fabricius.

This genus contains about twenty species, which are widely distributed, being found in Europe, South Africa, North America, Ceylon, Java, &c. ; they live in dung of herbivorous animals, in which they bore galleries ; our common species *S. scarabæoides* may often be seen on cow-dung in the hot sun, but at the least approach of danger it very swiftly disappears into its retreat.

The larva of *Sphæridium scarabæoides* is figured by Schiödte (l. Pl. vi., Fig. 1) : its shape is much like that of the maggot of the ordinary flesh-fly, the head being very narrow and the hinder portion of the body very broad in proportion; the colour is a dirty white with the mandibles blackish and the corneous parts fusco-testaceous; the thoracic scuta are complete, that of the prothorax bearing four round foveæ two on each side besides oblique impressions, and those of the meso- and meta-thorax (which are very short) being strongly and coarsely punctured; the eighth segment bears four exerted conical appendages, and has a broad quadridenticulate apex; the larva is virtually legless, but Schiödte considers the small projections on the under surface to be rudimentary legs wanting the tarsi.

- I. Margins of thorax and elytra not lighter; legs black; elytra dark with apex broadly testaceous; length $5\frac{1}{2}$ - $6\frac{1}{2}$ mm. *S. SCARABÆOIDES*, F.
- II. Margins of thorax and elytra more or less narrowly testaceous; legs testaceous; length 1- $5\frac{1}{2}$ mm.
 - i. Each elytron with a red spot more or less distinct at apex *S. BIPUSTULATUM*, F.
 - ii. Elytra without spots at apex *var. MARGINATUM*, F.

S. scarabæoides, F. Almost round, apparently truncate behind, whole upper surface very thickly and finely punctured, shining black; antennæ and palpi black, apex of last joint of maxillary palpi red; thorax with sides rounded and margined, base bisinuate, posterior angles slightly produced, almost right angles; elytra as broad as thorax, with base and margins bordered, with an obscure, sometimes obsolete spot towards shoulder, and a transverse irregular testaceous band at apex, interrupted by the suture, which is always black; sutural stria distinct from apex to beyond middle, effaced in front; legs black or pitchy sometimes with reddish spots. L. 6- $6\frac{1}{2}$ mm.

Common and widely distributed throughout the kingdom.

S. bipustulatum, Fab. Shorter than the preceding and more depressed, shining black, upper surface densely and finely punctured; thorax and elytra with margins more or less narrowly testaceous, the former with sides rounded and plainly bordered, posterior angles produced and sharp; elytra as broad as thorax with an obscure reddish spot towards shoulder, which is often obsolete, and a common irregular reddish or reddish-testaceous spot at apex, which is not interrupted by suture; sometimes the whole elytra is of a reddish colour with extreme margins lighter, in which case all the spots are indistinct; legs testaceous, femora usually with dark markings. L. 1- $5\frac{1}{2}$ mm.

The *r. marginatum*, F., has the upper surface entirely black with the margins of the thorax and elytra sometimes rather broadly, sometimes very narrowly testaceous.

The *r. scutistratum*, Cast., has the elytra furnished with more or less distinct punctured striae or rows of punctures.

Rather common, and widely distributed throughout the kingdom.

CERCYON, Leach.

This genus, according to the Munich Catalogue, contains about seventy

species, which are widely distributed over the surface of the globe; many of them are very difficult to determine, as may be gathered from the fact that Stephens described no less than sixty species from Britain alone; the majority of the species live in the excrement of herbivorous animals, but some are only found in moss, &c., on the margins of ponds or streams, while a few live under sea-weed and decaying vegetable matter on the sea coast in localities that are often submerged at high water; they are all small, but vary considerably in size, and also in colour; the chief points of distinction lie in the size, shape, and punctuation of the interstices of elytra; in many cases the colour is a sure means of distinction, but occasionally it is misleading: the larva of *C. littorale* is described by Thomson (Skand. Col. ii. pp. 103, 104); it is pale testaceous, with the head ovate, the prothorax semicircular, and the mesothorax transverse; the maxillæ are longer than the antennæ, which are three-jointed; the mandibles are sickle-shaped, sharp at the apex, with a sharp tooth on their inner margin; the abdomen is coriaceous with the last ventral segment trienspid; there are no legs; it is found under sea-weed with the perfect insect.

The larva and pupa of *Cercyon analis* are figured by Schiödte (i., Pl. vi., Fig. 8 and 24): the larva very closely resembles that of *Sphæridium scarabæoides*, but the scuta of the meso- and meta-thorax are incomplete, and the eighth segment bears two short filamentous cerci and no conical appendages: the legs are entirely wanting: the pupa of *Cercyon* is narrower and not so round as that of *Sphæridium*; it is not so thickly covered with the long appendages so marked in the pupæ of the Hydrophilidæ, and called by Schiödte the "styli motorii," and the cerci attached to the last segment are longer.

- I. Upper surface depressed (species always found on the coast).
 - i. Anterior tibiæ emarginate at apex; striæ of elytra continued to apex *C. LITTORALIS*, Gyll.
 - ii. Anterior tibiæ simple at apex; striæ of elytra obsolete towards apex *C. DEPRESSUS*, Steph.
- II. Upper surface more or less convex (species generally distributed).
 - i. Thorax separately convex, forming an angle, when viewed sideways, with the convexity of the elytra. *C. HEMORRHOUS*, Gyll.
 - ii. Thorax and elytra, viewed sideways, presenting an evenly rounded contour.
1. Punctuation of interstices of elytra distinct.
 - A. Length 3-4 mm.
 - a. Elytra slightly narrowed towards apex; fourth stria of elytra parallel to third; size smaller *C. HEMORRHODALIS*, F.
 - b. Elytra as broad in front as behind; fourth stria of elytra approaching third; size larger *C. OBSOLETUS*, Gyll.
 - B. Length 2-3 mm.
 - a. Sides of thorax concolorous with disc; apex of elytra often prolonged into a tooth.
 - a*. Elytra lighter or darker reddish brown *C. FLAVIPES*, F.
 - b*. Elytra orange red with a well-marked triangular dark patch around scutellum *C. MELANOCEPHALUS*, L.
 - b. Sides of thorax more or less broadly reddish or yellowish; apex of elytra not prolonged.

- a*. Elytra dark with a well-defined apical yellowish patch extending upwards along margins to base *C. AQUATICUS, Muls.*
 b*. Elytra yellowish-testaceous with a well-defined large common dark spot about middle *C. UNIPUNCTATUS, L.*
 c*. Elytra lighter or darker reddish brown with margins of thorax broadly and obscurely reddish *C. LATERALIS, Marsh.*

C. Length 1·2 mm.

- a. Lateral margins of thorax narrowly continued along base, for at all events some little distance; elytra yellow-testaceous.

- a*. Size larger, striae deeper *C. QUISQUILIUS, L.*
 b*. Size smaller, striae feebler *C. NIGRICEPS, Marsh.*

- b. Posterior margin of thorax not bordered.

- a*. Size smaller; elytra not acuminate at apex.

- a†. Inner striae of elytra confused and feeble towards base; form shorter *C. PYGMEUS, Ill.*

- b†. Inner striae of elytra very plain at base; form longer *C. TERMINATUS, Marsh.*

- b*. Size larger; elytra acuminate at apex *C. ANALIS, Payk.*

2. Punctuation of interstices of elytra indistinct or absent.

A. Striae of elytra continued to apex.

- a. Elytra duller than thorax; second joint of maxillary palpi not or only slightly dilated *C. LIGUBRIS, Payk.*

- b. Elytra as shining as thorax; second joint of maxillary palpi considerably dilated *C. GRANARIUS, Er.*

B. Striae of elytra not continued to apex *C. MINUTUS, Muls.*

C. littoralis, Gyll. Oval, depressed, black, shiny, thickly punctured; clypeus emarginate at apex; thorax transverse with the sides rounded; elytra with punctured striae which are deeper towards apex, interstices thickly punctured; apex broadly testaceous; legs pitchy or reddish; anterior tibiae excised externally before apex; the colour is somewhat variable, the thorax and elytra being sometimes margined with red; occasionally the whole insect is reddish, or the elytra are pale red and the thorax darker; the colour, however, depends in great measure on the maturity of the insect. L. 2-3½ mm.

A maritime species; found on the coast, often below high-water mark under decaying sea-weed, rubbish, &c.; common and widely distributed in England and Scotland; Ireland, near Belfast and Baldoyle, and probably common.

C. depressus, Steph. (*dorso-striatum*, Thoms.). Very like the preceding, but distinguished by having the anterior tibiae entire, the clypeus subtruncate or rounded at apex, and by the fact that the elytral striae are evanescent towards apex; the colour is somewhat more variable as a rule, and the punctuation of the interstices of the elytra is rather more obsolete, but these latter characters are not to be depended upon; the average size is rather smaller. L. 2-3 mm.

Found under the same circumstances as the preceding, but much less common; Devonshire; Weymouth; Hayling Island; Isle of Wight (Ryde, Ventnor, &c.);

Shoreham; Deal; Whitstable; Swansea; Northumberland district (very rare); not recorded from Scotland; Ireland. recorded from Baldoyle, but this may be in error; I am rather inclined to think that Mr. Bold was mistaken in his Northumberland record; he says that he had only seen two or three local specimens, and these apparently were not captured by himself.

C. hæmorrhous, Gyll. (*ustulatus*, Preys., *hæmorrhoidalis*, F.). Oval, convex, thickly punctured, shining black with the apex of elytra red, the colour being usually distinctly marked; thorax separately convex, gibbous, slightly depressed at base ("prothorace pulvinato," Thoms.; "pronotum bombé isolement, tombant à la base," Bedel), sides rounded and finely bordered; elytra somewhat depressed on disc, with plainly marked striae, the external ones more plainly punctured than the dorsal; legs brownish, or reddish brown, tarsi lighter. L. $3-3\frac{1}{3}$ mm.

At roots of grass, under rubbish, in moss, &c., in damp places; sometimes under stones or in damp and decaying wood; it rarely occurs in dung; as a rule common and widely distributed in England and Wales, but not so common further north; Scotland, local, Lowlands, Forth and Solway districts; Ireland, near Dublin.

The shape of the thorax, if viewed sideways, will at once distinguish this species.

C. hæmorrhoidalis, Herbst. (*impressus*, Sturm). Short oval, thickly and finely punctured; head and thorax shining black, the latter with sides rounded and more narrowed in front than in the preceding species, with a very short but distinct longitudinal impression at base just in front of scutellum; this impression is often present, but less distinct in the preceding and following species; elytra somewhat depressed on disc, black towards base and thence gradually reddish to apex, the colour being suffused and not distinctly marked off; striae punctured, the fourth straight, interstices wide, finely punctured; legs brownish, femora darker. L. $3-3\frac{1}{2}$ mm.

In dung, &c.; common and widely distributed throughout the kingdom.

C. obsoletus, Gyll. (*lugubris*, Ol.). The largest of our species; oval, as broad in front as behind, thickly and finely punctured, shining black with the apex of elytra reddish; thorax convex, with sides rounded and margined; elytra a little broader than thorax, rather depressed on disc, with fine punctured striae; legs reddish brown, tarsi usually paler; the fourth stria of the elytra is not straight, and gradually approaches the third, so that the fourth interstice is narrowed for part of its length; the interstices are distinctly punctured. L. 3-4 mm.

In dung, &c.; local, and as a rule not common; London district, generally distributed; Hastings; Birmingham; Burton-on-Trent; Swansea; Northumberland district, rare; Scotland, scarce, Lowlands, Tweed, Forth, and Solway districts; Ireland, near Waterford (Power) and Dublin.

C. aquaticus, Muls. Oval, not very-convex, thickly punctured; head shining black; thorax black with margins reddish; elytra a little broader than thorax with fine punctured striae, which become feebler

towards apex, black with the apex yellowish testaceous or reddish, the colour being very distinctly marked and continued along the margins to base; legs reddish, tarsi paler; the species may at once be distinguished by the colour of the elytra. L. $2\frac{1}{2}$ –3 mm.

At roots of grass, in moss, &c., in damp and marshy places; local, and not common; London district, Sheppy, &c.; Hastings; Devonshire; Heysham, near Lancaster; Northumberland district; Scotland, rare, Lowlands, Tweed and Forth districts.

C. flavipes, F. Oblong-oval, moderately convex, thickly punctured; head and thorax black, antennæ and palpi dark; elytra lighter or darker reddish brown or reddish black, with the apex and more or less obsolete markings on disc and towards base lighter, with rather fine punctured striae, interstices plainly punctured; legs reddish, femora darker; the apex of the elytra is often prolonged into a sharp tooth which is distinctly visible if the insect is viewed sideways, but this character is not always constant, and perhaps is sexual. L. $2\frac{1}{2}$ –3 mm.

In dung, &c.; common and widely distributed.

C. lateralis, Marsh. Very like the preceding in size and general appearance; head black, shining; antennæ and palpi red, club of former darker; thorax black with sides broadly and obscurely reddish; elytra reddish brown with the apex and other more or less obscure markings lighter, or the ground is lighter with obscure darker markings; striae fine, punctured, interstices distinctly punctured; this species may easily be distinguished from the preceding by the reddish sides of thorax and lighter mouth organs. L. 2–3 mm.

In dung; also by sweeping; common and widely distributed.

C. melanocephalus, L. Oblong-oval, convex, shining; head and thorax black, antennæ and palpi dark; elytra with fine punctured striae, bright orange red with the scutellum and the region about it black in the form of a distinct triangle; there is also an elongate dark patch near shoulders at margin; interstices punctured; legs reddish testaceous, femora darker; as in *C. flavipes* the apex of elytra is often produced into a tooth. L. 2–3 mm.

In dung, &c.; very common and widely distributed throughout the kingdom.

C. unipunctatus, L. Oblong-oval; head black, shining, thickly punctured; thorax black with the sides sharply yellowish; elytra rather depressed on disc, dorsal striae not distinctly punctured in middle, lateral striae reduced to rows of punctures, yellowish-testaceous with a large dark common spot about middle; legs and sometimes part of the under-side reddish yellow. L. 2–3 mm.

In dung, &c.; common and widely distributed.

Occasionally the dark spot is much smaller, and rarely it is quite obsolete.

C. quisquiliæ, L. Oblong-oval, head black, shining, thickly punc-

tured; antennæ and palpi testaceous, club of former darker; thorax black; unicolorous, or with the sides very narrowly pale at extreme margins, thickly punctured, with a fine border, which is continued on each side for some little distance along base; elytra shorter and broader in proportion than in the preceding species and less narrowed at apex, entirely testaceous, suture sometimes somewhat dusky especially towards scutellum, with punctured striæ which become much feebler at sides; interstices flat, thickly punctured; legs reddish yellow or yellow: from immaculate examples of the preceding this species may be distinguished by its smaller size, shorter elytra which are more broadly rounded at apex, narrower pale margins of thorax, and more closely punctured interstices of elytra. L. $1\frac{1}{2}$ –2 mm.

In dung, &c.; common and widely distributed throughout the kingdom.

C. nigriceps, Marsh (*centromaculatus*, Sturm). Short-oval; head shining black, antennæ and palpi yellowish red, club of former not darker; thorax brownish-black with sides rather broadly and not sharply reddish, finely bordered, the border continued on each side along base; elytra yellowish-testaceous with distinct punctured striæ, usually with an obscure dark band or broad marking behind middle, which, however, is sometimes obsolete; the internal striæ are continued plainly to base; metasternum with an oblique line on each side; legs testaceous. L. $1-1\frac{1}{2}$ mm.

In dung, &c.; not common; Greenwich, Reigate, Forest Hill, Dulwich; Hastings; Norfolk; Edgbaston; Devonshire and Cornwall (Whitsand Bay, near Plymouth, &c.); Northumberland district; Scotland, Solway district only.

This species differs from *C. quisquilius* by its smaller size, more rounded posterior angles of thorax, more broadly red margins of thorax, and the more finely punctured interstices of elytra.

C. pygmæus, Ill. Oval, somewhat oblong, moderately convex; head and thorax black, rather finely punctured, the latter with the base not bordered towards sides; elytra narrowed towards apex, very variable in colour, sometimes black with apex reddish, sometimes entirely reddish with the region round scutellum and shoulders black, and presenting many variations between these extremes; striæ of elytra rather fine and not strongly punctured, the inner ones obsolete towards scutellum, interstices punctured; metasternum with an oblique line on each side; elytra somewhat rugose at base; legs reddish testaceous. L. $1-1\frac{1}{2}$ mm.

In dung, &c.; common and widely distributed.

This species comes very close to *C. nigriceps*, but is more narrowed at apex of elytra, and is always furnished with a dark patch around scutellum; the colour of the thorax, which is unicolorous black, will also distinguish it, and the fact that the inner striæ in *C. nigriceps* are distinct at base, whereas in *C. pygmæus* they are obsolete near scutellum.

C. terminatus, Marsh (*scutellaris*, Steph., *plagiatus*, Er.). Rather

long oval, convex, shining; head and thorax black or brownish-black, closely and rather strongly punctured; antennæ and palpi testaceous, the former with the club elongate; elytra variable in colour, either reddish testaceous with the base black, or black with apex reddish, or with dark longitudinal markings on each, leaving the suture, apex, and sides red, with plainly punctured striae, which are distinctly continued to base and apex; interstices rather strongly punctured; metasternum without the complete lateral oblique lines which are found in the two preceding species; legs reddish testaceous. L. 2 mm.

In dung-heaps, &c.; often caught on the wing; local, and not common; Whitstable, Cobham, Greenwich, Forest Hill, Putney, Dulwich, Merton, Ealing, Hampstead; Hastings; Exmouth; Manchester district; Northumberland district; Scotland, rare, Tweed district; Ireland, near Belfast: Dr. Power tells me that he has always taken this species flying (generally near a wood-stack), and that he has never found it in dung.

From *C. pygmaus* it may be at once distinguished by its larger and longer form, the much stronger striae of elytra which are complete to apex, the stronger punctuation of the interstices of elytra, and by the oblique lines on the metasternum being absent or abbreviated behind.

C. analis, Payk. Ovate, shining; head and thorax black, finely punctured; elytra black with apex reddish testaceous, narrowed gradually from a little behind middle to apex which is acuminate and somewhat deflexed; elytra convex, with punctured striae which are continued to apex, interstices plainly punctured, with, as a rule, two rows of punctures on their anterior half, and one row on the posterior; the ninth interstice has one row of punctures, and in this point differs from many of its allies; legs testaceous. L. 2 mm.

In flood rubbish, bottoms of hay-stacks, decaying sea-weed, &c.; common and generally distributed.

C. lugubris, Payk. Oval, very convex, shining black; head and thorax thickly punctured, antennæ and palpi reddish or reddish-black; thorax with the sides rounded and bordered; elytra a little broader than thorax, convex, contracted behind, with punctured striae which are plainly continued to apex; interstices depressed, almost impunctate, and alutaceous, so that the surface of the elytra appears almost dull; apex of elytra more or less distinctly red except at suture; mesosternum narrow, somewhat lanceolate; legs testaceous red. L. $1\frac{1}{2}$ –2 mm.

At roots of grass in marshy places, in flood rubbish, &c.; not uncommon; Lee, Sheerness, Shirley, Walton-on-Thames and London district generally; Sussex, Devonshire and southern counties generally; Midland districts; Liverpool; much less common towards the north; not recorded from the Northumberland district, and rare in Scotland, Forth district only.

C. granarius, Thomas. Very like the preceding, from which it was separated by Thomson; the elytra, however, have more distinctly punctured and stronger striae, and the interstices are less alutaceous, so that the elytra appear more shining; the second joint of the maxil-

lary palpi is rather strongly dilated, and the mesosternum is oval. L. $1\frac{1}{2}$ –2 mm.

This appears to be rather a doubtful species; I have specimens of what I believe to be *C. lugubris* taken together and mounted on the same card, which seem to vary in the dilatation of the second joint of the maxillary palpi, and in some of the Hydrophilidæ (e.g. *Limnebius*) this seems to be a sexual and not a specific character; with regard to the less alutaceous and more shining elytra it is quite possible that this also is sexual, as a double form of the female (shining and dull) is very common in the *Hydropori* at all events, and might be found in other families; the character of the mesosternum appears to be the one most to be relied upon for its distinction as a species.

Found under the same circumstances as the preceding, and probably overlooked; Birmingham district; Walton-on-Thames; it is very likely that it is widely distributed, but mixed with *C. lugubris* in our collections.

C. minutus, Muls. (*tristis*, Ill.). This species also chiefly resembles *C. lugubris*, but is easily distinguished from it by not having the striæ of elytra continued to apex, so that the apex is smooth; the elytra also are less contracted and rounder behind, and the punctured striæ are finer; the mesosternum is somewhat narrower, and the legs and palpi as a rule a little darker; the interstices of the elytra are almost impunctate, alutaceous, and dull, as in *C. lugubris*; this character will at once separate the species from *C. analis*. L. $1\frac{1}{2}$ –2 mm.

Found like the two preceding in flood refuse, at roots of grass, in moss, &c, in marshy places, and like them not occurring in dung; not common; Notting Hill (formerly), Weybridge, Walton-on-Thames, Blackheath, Dagenham; Tewkesbury; Scotland, Forth and Solway districts.

It is very probable that this and several other of the rarer *Cercyon*s are much commener than they seem to be, as from their close resemblance to the common species they must often be passed over by collectors, who, as a rule, do not trouble themselves much about this genus.

MEGASTERNUM, Mulsant.

This and the succeeding genus, as remarked before, are easily distinguished from *Cercyon* by the much greater width of the mesosternum; from *Cryptopleurum* this genus may at once be separated by the anterior tibiæ being emarginate externally in front; it contains three or four species from Europe, Japan, and North America.

M. boletophagum, Marsh. Short oval, very convex, somewhat narrowed behind, smooth and shining, black, or dark pitchy brown; antennæ, palpi, and legs red, club of former darker, second joint of maxillary palpi dilated; sides of thorax sometimes reddish; elytra with apex somewhat obscurely red, with rather distinct rows of punctures set in obsolete striæ which are often hardly traceable; interstices punctured:

the emargination of the anterior tibia is very strong, and at once distinguishes the species. — L. $1\frac{1}{2}$ –2 mm.

In decaying vegetable matter, rotting fungi, dung, &c.; common and widely distributed.

CRYPTOPLEURUM, Mulsant.

This genus is remarkable for having the sides of the thorax broadly reflexed underneath and sharply angled in the middle of the margin of the reflexed portion; it contains five or six species from Europe, South Africa, North America, and Ceylon.

C. atomarium, Muls. (*minutum*, F.). Short oval, dull; head and thorax black, thickly punctured; antennæ and palpi reddish or brownish-red; elytra black with apex red, the reddish colour often extending some little distance upwards towards base; at the shoulders also there are often obscure lighter markings; striae very strong, almost sulcate, and strongly punctured, so that the interstices appear somewhat raised; interstices thickly and rather strongly punctured; legs reddish-testaceous; the sculpture of the elytra will at once separate this species superficially from all our species of *Cerygon* and *Megasternum*. — L. $1\frac{1}{2}$ mm.

In decaying vegetable matter, dung, &c.; common and generally distributed.

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